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Madras State Herbarium

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Centenary Souvenir

WITH THE COMPLIMENTS OF

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THE MADRAS STATE HERBARIUM

CENTENARY SOUVENIR

August 20, 1954

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This Souvenir is issued in commemoration of the Centenary of the Madras State Herbarium celebrated at the Agricultural College, Coimbatore, on August 20, 1954, under the presidency of Dr. A. Lakshmanaswamy Mudaliar, Vice-Chancellor, Madras University.

Thanks are due to all the gentlemen who contributed special articles for this Souvenir, to the Director of Information and Publicity and his staff for arranging the matter in good style and seeing it through the Press.

Thanks are also due to the Controller of Stationery and Printing for printing this Souvenir within the quickest possible time.

MADRAS,
August 16, 1954.

N. MURUGESAN,
Deputy Secretary Agriculture Department.

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FOREWORD

As Minister for Agriculture, I consider it a privilege to write a foreword to this Souvenir published in commemoration of the Centenary of the Madras State Herbarium. Thanks to the efforts of pioneers like Dr. Hugh Cleghorn, Colonel Beddome, and Dr. C. A. Barber and the eminent Botanists who succeeded them like Sri K. Rangacharya, Sri C. Tadulinga Mudaliar and others, the Herbarium now contains over 170,000 specimens representing the flora not only of this State and of the neighbouring States like Andhra, Mysore and Travancore-Cochin but also of North India. Let us on this occasion remember with gratitude all those who have developed the Herbarium during the 100 years of its useful existence and made it what it is to-day. Let us also hope that their successors will add to its wealth and make it a useful clearing house for botanical information about the plant wealth of the country.

Minister for Agriculture.
Government of Madras.

Madras
August 12, 1954.

Messages

SRI PRAKASA,
Governor of Madras

RAJ BHAVAN,
GUINDY, MADRAS-22,
July 29, 1954.

Among the many useful institutions in our State which have long records of public service to their credit and which are able to celebrate to-day their jubilees or centenaries, the name of the Madras State Herbarium must be prominently mentioned ; and I am happy to see that it will be celebrating its Centenary on the 20th August this year when the Agriculture College Day and Conference will also be held at Coimbatore.

Starting its career as far back as 1853, it has grown and been enriched by the devoted labours of a series of eminent botanists who have carried on their scientific researches with rare devotion. Their work has resulted not only in the enhancement of theoretical knowledge but has actually brought prosperity to the land by practical application of the same. It deserves every praise and gratitude.

It is my earnest hope that the Herbarium will continue to do its good work, and that it will receive every support and encouragement from our people, and that more and more persons will come to appreciate the value of its endeavours, and avail themselves of the knowledge that it can give.

SRI PRAKASA,
Governor of Madras.

K. KAMARAJ,
Chief Minister of Madras.

FORT ST. GEORGE,
MADRAS,
August 7, 1954.

I express my appreciation of the good work accomplished by the Madras State Herbarium during the last one hundred years. Madras State can be legitimately proud of the 170,000 specimens in the Herbarium. I feel sure that research workers in Botany and medical men working on indigenous drugs will make use of the Herbarium and contribute to the scientific advancement of the State.

I wish the Herbarium many more years of useful work.

K. KAMARAJ.

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DR. P. S. DESHMUKH,
Minister for Agriculture,
Government of India.

NEW DELHI,
August 6, 1954.

The Madras Herbarium is celebrating its Centenary this year. Beginning originally with a small collection of plants in the Madras Medical College, this Herbarium has grown in dimension and importance and has materially contributed to the progress of botanical research in this country. Successive generations of botanists have enriched the Herbarium by their collections so that it now can boast of nearly 170,000 specimens.

Such well-known names as Cleghorn, Beddome, Bidie, Wight, Barber and Rangachari, to mention only a few, have been associated with it. With such widely representative types of plants preserved therein, I believe the Herbarium, in course of time, will be able to help and inspire research work in systematics not necessarily limited only to regional interests but will also be in a position to draw investigators from all parts of India, and may be from outside as well.

Of special significance is the fact that the collection contains flora not only representative of the Madras State but includes type specimens from other vegetation regions of India too, as well as those of cultivated plants. I am happy to note that the applied aspects of systematic botany have been kept in view while building the Herbarium. This is, as it should be, for, the common man's appreciation of scientific research is largely dependent on the practical applicability of results obtained.

I am, therefore, specially pleased that the future programme of work comprises compilation of district floras of the Madras State containing information not only of the wild plants but also of those which are of importance to human beings and cattle. I wish the Herbarium all success.

P. S. DESHMUKH.

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GOVERNMENT OF INDIA,
MINISTRY OF NATURAL RESOURCES AND SCIENTIFIC RESEARCH,

New Delhi, August 5, 1954.

It gives me immense pleasure to send you my best wishes on the occasion of Centenary celebrations of the State Herbarium. Country should be proud of such an institution as from a nucleus of private plant collections, this has developed into India's premier Herbarium. The State authorities and the renowned Botanists who have rendered their valuable services to build up this organization, must be congratulated. I understand that this Herbarium has a fine carpological and seed collections, besides the vast collections of indigenous drugs and flora of South and North. Evidently, this institution is greatly responsible for the country's advancement in the study of plants and its contributions to the science of botany and allied subjects are praiseworthy. I wish this a grand success.

S. S. BHATNAGAR.
Secretary.

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K. R. DAMLE, I.C.S.,
Additional Secretary,
Ministry of Food and Agriculture,
Government of India.

NEW DELHI,
August 5, 1954.

I am glad to know that the Madras Herbarium is celebrating its Centenary in August this year. Herbaria are essential to the progress of botanical research and type specimens preserved therein serve as guides to plant collectors and explorers.

Obviously a Herbarium cannot be built up by a single individual in his lifetime ; its growth and development are helped by valuable collections made by enthusiastic botanists in successive generations.

In the present case, I find that the Madras Herbarium has been enriched by the collections among others of Cleghorn, Beddome, Bidie, Wight and Barbers. It is, therefore, apparent that the contribution of this Herbarium to the progress of botanical research in this country has been quite considerable. I am happy to note that the Herbarium is interested not only in systematics of wild flora but also concerns itself with the collection and preservation of various cultivated plants as well as those of economic importance.

I hope the Herbarium will continue to be a source of inspiration to botanists and continue to help botanical research in this country and in course of time build up a reputation among scientific workers such as, at present, is enjoyed by the Herbarium at Kew. I associate myself wholeheartedly with the Centenary celebration of the Madras Herbarium.

K. R. DAMLE.

DR. K. BISWAS,
Superintendent,
Indian Botanic Garden.

CALCUTTA,
August 2, 1954.

The Indian Botanic Garden, Calcutta, 67 years older than the Madras Herbarium and 50 years older than Kew, the mother and the oldest Herbarium, in India, offers its heartiest congratulations to the organisers for the celebration of the Centenary of the Madras Herbarium. During the long period of activities the Madras Herbarium has contributed much to the progress of scientific study of agriculture and other allied subjects.

The Indian Botanic Garden recalls with pleasure and gratification its close association with the Madras Herbarium. I have very much pleasure in sending you my best wishes for the future prosperity and continued development of the Herbarium for the welfare of agricultural science in India, in particular, and the world in general.

K. BISWAS.

C. R. RANGANATHAN,
Inspector-General of Forests.
Government of India.

NEW DELHI,
August 9, 1954.

The Madras Herbarium is one of the oldest and most renowned herbaria in India. It has played a leading part in the progress of taxonomy and botanical science in Madras and India. Great

developments are afoot in connection with the botanical survey of India and I am sure that the Madras Herbarium with its long and distinguished traditions will share in these developments and continue to make valuable contributions to the progress of India botany. On the occasion of the Centenary of the Herbarium, I offer, on behalf of the Forest Services of India, our warmest felicitations.

(Signed) C. R. RANGANATHAN,
Inspector-General of Forests.

LUND, SWEDEN,
July 28, 1954.

I have received your kind invitation of July 12, to join the centenary celebrations of the Madras Herbarium on August 20 of this year. It would, indeed, have been a great pleasure and honour to be present on this occasion but the great distance between Lund and Coimbatore will unfortunately make it impossible for me to accept your invitation. However, let me convey to you my heartiest congratulations to this fine jubilee as I realize the prominent role played by the Madras Herbarium not only in the development of Botany in India but for international botanical research as well. I am sure the next hundred years will show a further successful development along these lines to the benefit of theoretical and applied botany in India and to our world in general.

ARNE MUNTZING,
Professor of Genetics

INDIAN AGRICULTURAL RESEARCH INSTITUTE, NEW DELHI-12,
23rd *July* 1954.

I was very pleased to know from your circular letter that the Madras Herbarium is going to celebrate its Centenary next month. The contributions made by the Madras Herbarium in the past towards a better and clear knowledge of the vegetable covering of South India is indeed magnificient. It has to be admitted that some of the earliest collections of Rheede, Wight, Koenig and others which were made in South India are at

present deposited in Herbaria abroad because at that time Madras probably did not have any such institute. It was a good fortune that Doctor Cleghorn had the foresight to start a Herbarium in 1853 which has been gradually enriched by collections of such noted persons as Beddome, Barber, Rangachari and others. I believe some of the collections of Gamble and Lady Bourne are also there. All these have helped in the production of the memorable *Flora of the Madras Presidency* by Gamble.

As you will appreciate, the period of extensive work on flora of larger areas is over, and a period of intensive work on floras of small areas (like districts) has come. The Madras Herbarium will no doubt play its parts in the new era that has now dawned on us.

I wish to join with you all in wishing further prosperity and productive work from the Madras Herbarium.

D. CHATTERJEE,

M.SC., Ph.D. (Edin.), F.L.S. (Lond.),

Systematic Botanist.

ST. XAVIER'S COLLEGE, BOMBAY-1.

July 22, 1954.

The celebration of the first Centenary of the Madras Herbarium is a matter of pride for every patriotic Indian. Some of the greatest figures in modern Indian Botany have distinguished themselves in the collection and study of the flora of Madras, so that the State of Madras can at present justly claim to be the best explored of the various botanical provinces of India.

On this auspicious occasion we, the Director and research workers, of the Blatter Herbarium, who gladly acknowledge Coimbatore as our spiritual mother, heartily rejoice in the triumphs past and present of the Coimbatore Herbarium, and wish it long and prosperous life.

H. SANTAPAU, S.J., F.N.I.

The Rector.

ROYAL BOTANIC GARDENS,

KEW, RICHMOND, SURREY.

July 16, 1954.

I am in receipt of your invitation to attend the Centenary of the Madras Herbarium in August

You will, however, doubtless not be surprised that it is impossible for me to attend, indeed, my engagements are usually made many months in advance. But I would like to take the opportunity of congratulating you on your Centenary and on the work which you have carried out successfully during the past hundred years. And in conveying these congratulations on your past, I would add my best wishes for a successful future.

SIR EDWARD SALISBURY,

Director.

ROYAL BOTANIC GARDENS,
KEW, RICHMOND, SURREY.
July 16, 1954.

Thank you for your invitation to the festivities which will celebrate the Centenary of the Madras Herbarium. It will not, of course, be possible for me to be present, but I take this opportunity to send my good wishes for the success of the function.

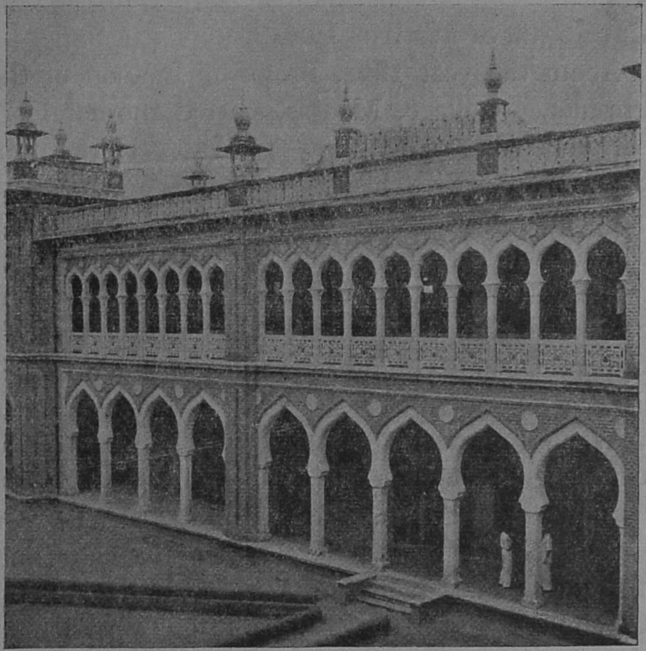
The record of the Madras Herbarium for the past hundred years is one of which any botanical institution may well be proud, and augurs well for the future of botanical science in Madras State.

DR. N. L. BOR,

Assistant Director.

Growth of the Madras State Herbarium

A Short Account



The Madras State Herbarium.

By *Sri C. Rajasekhara Mudaliar, M.A.*

(Systematic Botanist and Professor of Botany, Agricultural College, Coimbatore.)

THE Madras Herbarium, as it exists to-day, has passed through one hundred years with a chequered history. Its birth is as vague as its growth in the early years. Though the exact date or year when the Herbarium had its origin is not clearly known, it is definite that Doctor Hugh Cleghorn, the then Professor of Botany at the Madras Medical College, was responsible for starting it. Doctor Cleghorn's specimens bearing the labels of the Madras Museum Herbarium and the year 1853 indicate that the Madras Museum Herbarium was started by about that period. The collections of Sir W. Elliot, Doctor Drew and those of Doctor Cleghorn seem to have formed the nucleus of the Herbarium, as these sheets also bear the year 1853 under the Madras Museum Herbarium labels.

Valuable and important acquisition.

The Museum Herbarium was enriched by the collections of specimens of Doctor Cleghorn when

he became the first Conservator of Forests in the year 1856. Succeeding Doctor Cleghorn, Colonel Beddome became the Conservator of Forests and made his contributions to the Herbarium, whenever he had the time and opportunity to do so. When Colonel Beddome left for Europe in 1873, he gave his private herbarium, to the Madras Museum in consideration of a sum of Rs. 1,500. This collection containing, as it did, some 6,000 specimens of nearly all the trees, shrubs, and flowering plants from all the mountains and unexplored and dense forest regions of this country, was considered a very valuable and important acquisition. It included 1,897 species which were then unrepresented in the Museum Herbarium and also a large number of duplicates which it was thought could be most advantageously exchanged with herbaria in other parts of the world.

Strengthening of Botany Section

It was between the years 1872-1884 when Surgeon George Bidie (also Secretary and Statistical Officer to the Surgeon-General) was the Superintendent of the Museum that the Botany section of the Museum was strengthened. Bidie himself made plant collections for the Herbarium and published a monograph on medicinal plants.

"The Madras Museum Herbarium became famous and well known even at Kew. A libellous criticism that it was not maintained well was set afloat by some interested persons in England and the Secretary of State ordered an enquiry and the officer reported that it was as well maintained as any herbarium in Europe." (Hundred years of the Madras Government Museum, 1851-1951.)

Catalogue of Madras Plants

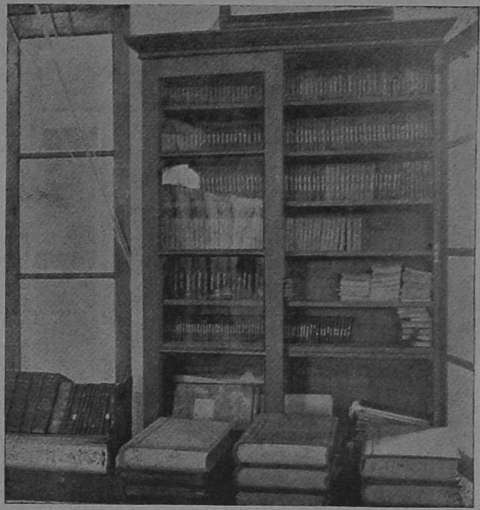
About the year 1874, Professor Lawson of the Presidency College, Madras, started another Herbarium which was known as the Madras Herbarium. He prepared with his own hand a "Catalogue of plants growing in the Madras Presidency" which included 3,295 species. This list appears to be incomplete, as only families up to Commelinaceae are dealt with; Palmaceae, Araceae, Cyperaceae and Graminae are not included in this list.

When Professor Lawson was appointed as Government Botanist at Ootacamund, the Herbarium was shifted to Ootacamund. Mr. Lawson was in charge of the development of Cinchona. In 1897, subsequent to the separation of the Cinchona and the Botanical Departments, the Herbarium at the Government Gardens, Ootacamund was again shifted to Madras. It was

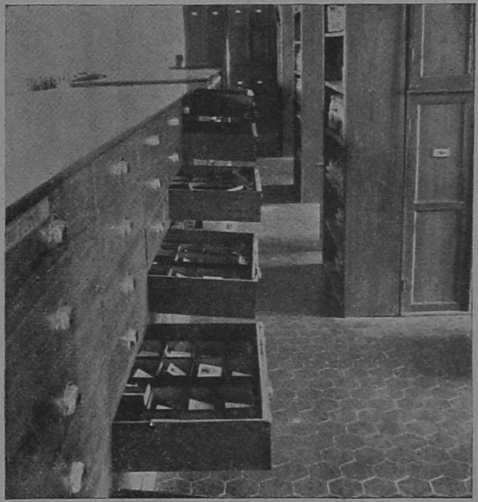
also partly due to the climatic conditions at Ootacamund, which was not conducive to the proper maintenance of the specimens in that cold, and moist atmosphere.

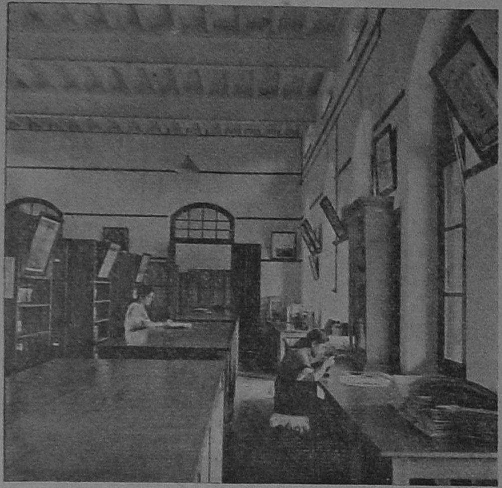
Further Contributions

Further contributions to the Madras Herbarium, appear to have been made by Dr. A. G. Bourne. During September 1897, Bourne completed Lawson's catalogue of plants growing in the Madras Presidency and published it as the "List of species of plants which are supposed to be indigenous to or denizens of Southern India" and concluded as "drawn up from the Herbarium as left by the late M. A. Lawson." During February 1897 to January 1898 Bourne was the acting Superintendent of the Madras Museum when Dr. Edgar Thurston was on furlough. It is not clear whether the Madras Herbarium organized by Lawson and the Museum Herbarium got merged together during this period or afterwards. In March 1897, Sri K. Rangachari was appointed as the Madras Herbarium-Keeper at the Madras Museum Herbarium. "Till 1896-1899, the only technical assistant was the Herbarium-Keeper; during the year 1898-99, the Museum Herbarium was transferred to the Government Botanist" (Centenary Souvenir of the Madras Museum).

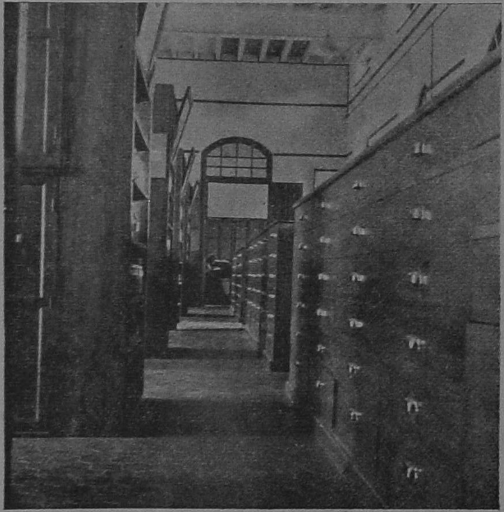


Herbarium Records.





Herbarium—Interior view.



Carpological Specimens.

In 1898, Dr. C. A. Barber came to India to take up the dual appointment of Government Botanist, Madras, and the Director of the Botanical Survey of South India on a five-year basis. Doctor Barber's duties were "mainly in the prosecution of the systematic botanical survey of the Presidency." He was also "the Constitutional Adviser to Government in regard to all the questions and enquiries into economic botany." Officially the Botanist was placed under the immediate control and orders of the Board of Revenue (R.O. No. 102, Press, dated 8th February 1899). Doctor Barber started his botanical collections from 22nd December, 1898 from round about Madras and made great contributions towards the excellence of the Herbarium.

Agriculture Department Organised

The Madras Agricultural Department was organized in the year 1902 and Doctor Barber continued to be the Government Botanist. The Office of the Government Botanist was transferred from Madras to Coimbatore on the 15th March 1909 and in June-July 1909, the Madras Herbarium was also shifted to Coimbatore and is since housed at the Agricultural College and Research Institute, Coimbatore.

Till about 1908 the Madras Herbarium had nearly 40,000 specimens most of which were from South India (*Imperial Gazette of India*—Madras I —1908). The Herbarium continued to be under Doctor Barber, the Government Botanist, till 1912, when he was posted as the Government Sugarcane Expert. Doctor Barber's collections alone for the Herbarium exceeded 16,700 specimens of wild plants and 4,500 specimens odd economic plants and mycological specimens.

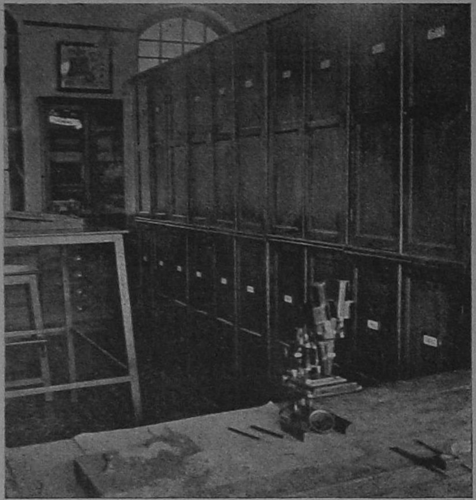
South Indian Grasses

During 1912, the Government Botanist's post was split into the Government Economic Botanist and Lecturing Botanist, the latter being in charge of the Herbarium and the lecturing work. Sri K. Rangachari was the Lecturing Botanist from 1912 till 1923, when he retired. Sri Rangachari also added to the wealth of the Herbarium specimens by his constant Botanical Surveys and in particular by the very valuable collections from Tirunelveli district. His intensive studies on grasses resulted in the publication of the " Hand Book of Some South Indian Grasses " in 1920 with Sri C. Tadulingam Mudaliar as the joint author. After Sri Rangachari retired, Sri C. Tadulingam Mudaliar became the Government Lecturing and Systematic Botanist and the Herbarium was under his control between 1923 to 1929.

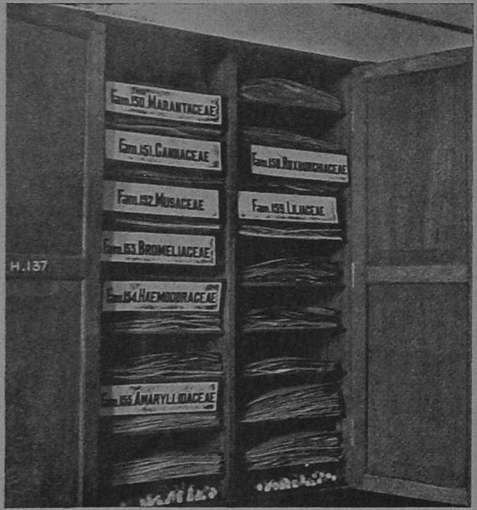
Herbarium Administration

From 1929 to 1942, the Herbarium passed through many administrative hands and charges. The post of the Government Lecturing and Systematic Botanist was split into two posts, as Systematic Botanist and Lecturer in Botany, filled up by Sri V. Narayanaswami and Sri P. S. Jivanna Rao respectively. After two years the Systematic Botanist's post was retrenched and the Herbarium went under the administration of the then Principal, Sri C. Tadulingam Mudaliar till 1940. From 1940 to 1942, the Herbarium was under Sri G. N. Rangaswamy Ayyangar, the Millet Specialist, and Sri P. S. Jivanna Rao. From 1942, it was brought under Sri S. N. Chandrasekharan, Lecturing Botanist, whose designation was subsequently changed again as Government Lecturing and Systematic Botanist. From 1950 Sri C. Rajasekhara Mudaliar whose designation has been changed as Systematic Botanist and Professor of Botany, continues to be in charge of the Herbarium.

The Madras Herbarium, through the indefatigable efforts of the Botanists referred to above



View of work table.



Herbarium cases.

AUG 1954 MADRAS

and their subordinates, has grown now to the present status with nearly 170,000 specimens comprising about 125,000 specimens representing the Flora of Madras Presidency including Mysore, Coorg, Cochin and Travancore, about 25,000 specimens representing North India, Burma, Malaya, Ceylon and other foreign countries, and about 20,000 specimens representing the garden and economic collections.

Compilation of the Flora of Madras State

A large number of South Indian collections has been authenticated by the authorities at Kew and includes many types and co-types of South Indian species. Specimens from the Herbarium were transhipped in large numbers to Kew from time to time on loan, for helping in the compilation of the Flora of Madras Presidency by Gamble. About 100 new species were described from material available in the Herbarium both in Gamble's Flora and other publications.

The arrangement of specimens in the Herbarium is done in a scientific and systematic manner. The Madras Flora, comprising the plants of the Madras State (undivided), Travancore, Cochin, Coorg and Mysore are arranged in the order drawn up by Gamble.

Under each species, the specimens are arranged in the alphabetical order of the districts and States, so that the distribution of the species could be easily studied from the collections. The north Indian, Burmese, Malayan and Ceylon specimens are arranged in the order of Hooker's Flora of British India ; garden and other exotic collections are arranged according to 'Genera Plantarum' by Bentham and Hooker.

The Herbarium collections now include the very valuable collections of Wight, Beddome, Bourdillon, Gamble, Hooker and Thompson, Perrottet, Heyne, Rottler Schimid, Jowitt, etc., besides those of Drew, Elliot, Cleghorn and the other botanists.

Carpological and Spirit Collections

Besides the representative collections of plant specimens, the Madras Herbarium has an unique collection of carpological specimens well labelled and arranged in attractive cases. The carpological collection of fruits, especially those too large to be mounted on Herbarium sheets, has been found to be very useful for identification work. A good collection of seeds in bottles and specimen tubes, an indigenous drug collection, a collection of wet specimens in spirit and formal dehyde containing specimens of succulents such as fruits, *Euphorbias* or delicate specimens as algae, water plants, flowers, etc., also add to the utility of the Herbarium.

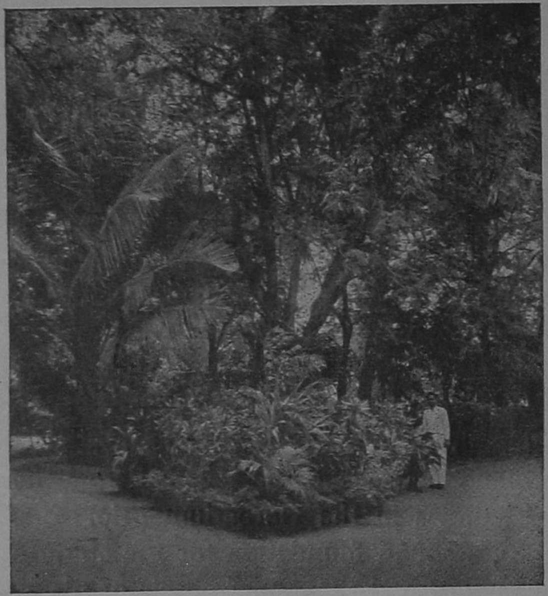
The library attached to the Herbarium contains most of the publications which are required for day-to-day reference and study. The rare and earlier publications on Systematic Botany as those of Linnaeus, Willdenow, Decandole, Engler and Prantl, Rheede, Rumphius, etc., are carefully maintained at the general Library of the Agricultural College and Research Institute and are easily available for reference and study.

Advancement of knowledge in Botany

Though definite data are not available about the economic aspects as developed from the systematic studies in the Herbarium prior to Doctor Barber, a sound foundation for the study of both fundamental and economic aspects of plant wealth of the Madras State was laid by the steady building up of the Herbarium. When Doctor Barber took up the work connected with the Herbarium, he paid special attention to the various economic aspects as related both to forestry and agriculture.

Dr. Barber's work

Exhaustive studies on epiphytes, parasites and saprophytes wore conducted by him and his monumental work on the sandalwood haustoria will long be remembered by the scientific world. Pioneer work was done on the investigations of the sugarcane mosaic and the causes for the low yield in sugarcane and these findings were utilized for laying the foundation of Sugarcane Research and Sugar Industry in South India. The Herbarium may well claim to have been the parent organization from which various economic off-shoots such as the Sugarcane (now the Indian Sugarcane Institute), the Paddy, Mycology and Entomology sections originated.



Botanical garden, Coimbatore.

Flora of Madras State

Dr. J. S. Gamble of the Forest Department began the compilation of the Flora of Madras Presidency in 1912. Most of the specimens from the Madras Herbarium were shipped to Kew, London, in various consignments to be utilized for the compilation of the Flora. Incidentally all these sheets sent to England have been carefully gone through by the eminent botanists at Kew and authenticated.

The first part of the Flora was published in 1915 and the eleventh and the last part was completed

in 1935. The publication of the Flora of Madras Presidency was one of the monumental works on systematic botany of South India and the contribution of the Madras Herbarium for this publication has been a significant one. Besides being useful for the compilation, nearly 98 new species of plants which have not been described before were named and described from the material in the Madras Herbarium.

Sectional Floras—Grass Flora

Sri K. Rangachari after taking over charge of the Madras Herbarium from Doctor Barber in 1912, took up a systematic study of the South Indian grasses and as an outcome of this, the first book on grasses in South India was published as the "Hand-book of some South Indian Grasses" in 1920, with Sri C. Tadulingam Mudaliar as the joint author. Nearly a hundred grass species were described in detail with suitable sketches bringing out the economic uses. This formed the preliminary work for further surveys of grass species.

With the economic aspects in view, detailed grass surveys were conducted in most of the districts and a fodder grass map has been prepared as a guide for grass improvement work. A number of species of grasses collected from these surveys were put under observational trials under Coimbatore conditions and sixteen promising and useful grasses suited for different soil and climatic conditions of South India have been selected. The present work on the fodder and pasture grasses and grasses suitable for soil conservation is an outcome of the systematic grass surveys taken up by the Herbarium.

Survey of South Indian Weeds

A study of the weeds, which infest particularly the crop fields, was carried out from the Herbarium and the "Hand-book of South Indian Weeds" was published by Sri C. Tadulingam Mudaliar. This book is a very valuable publication with a number of diagrams and complete descriptions of weeds which make it easy for identification and arriving at control measures. Since the first edition has gone out of print, a second revised and enlarged edition has been prepared and awaits publication.

Taxonomical studies on the species *Cucurbita* in South India were taken up and the important commercial varieties were classified. A new variety of *Cucurbita maxima* was named and described as var *badagarensis*; since this new variety is a very short duration economic type, seeds were arranged to be multiplied and distributed.

The Conservatory, Coimbatore College.

Seed House—Ootacamund.

Since fairly large areas on the West Coast and certain estuarine regions of the East Coast are covered with back-waters, a survey of the vegetation of these back-waters was undertaken. A very valuable information on the possibility of utilizing the naturally occurring *Rhizophora mucronata* and *Aegiceras majus* for tanning purposes was brought out. A few species of leguminous plants for saline areas were also spotted out and published.

Regional Floras

The Flora of Madras Presidency by Gamble pertains to the whole State in general. To have a detailed knowledge of the plant wealth of the country, it is essential that the floras of small regions of the State are prepared and with this object in view, Sri K. Rangachari as early as 1917 began the Flora of Tirunelveli district beginning botancial surveys in that district. After a little preliminary work, the regional district surveys were not continued. This was revived again in 1945 and the Flora of Tirunelveli district has just been completed and it is ready for publication.

Survey of the islands on the Gulf of Mannar on the coast of Ramanathapuram district was done during 1945 and that of the whole district has now been taken up. From the above survey in the

islands, an important pasture grass, *Cenchrus Ciliaris* var *Echinoides* suited for sandy loams was obtained. The possibility of exploiting economically the sea-weed *Gracillaria* from the coast of Ramanathapuram district was also brought out. The compilation of the Flora of Ramanathapuram and Coimbatore districts is in progress.

Botanic Garden

As an adjunct to the Madras Herbarium, a botanic garden is being maintained only from recent years, though it was formerly serving as a garden for study by the students and as a recreational centre and a park. Since its change over as a botanic garden, attempts are being made to introduce and acclimatize important plants both indigenous and exotic, without losing sight of the ornamental, educative, recreational and nursery aspects. The Botanic Garden at Coimbatore now serves as the centre for Plant Introductions of the State which are being carried on, on a limited scale by the staff of the Herbarium. Plant introduction and acclimatization trials on fodder and pasture grasses and legumes, green manure and green leaf manure plants, soil conservation plants, essential oil-yielding plants and other economic plants not dealt with by crop specialists, now form important items of work in the testing grounds of the Botanic Gardens.

Future Scope of the Herbarium Work

The botanical surveys of all the districts have not been done in detail and this is clearly brought out from the work recently done in Tirunelveli and Ramanathapuram districts. To study the potentialities of the plant wealth, their distribution and proper utilization, more botanical surveys are essential.

Even from the already described species by Gamble, the Herbarium is falling short of nearly 360 species which are desiderata and which have to be searched for. With the botanical garden as its adjunct there is a great possibility of further plant introduction work to be carried on by the Systematic Botanists for developing economic aspects such as green manure and soil conservation plants, essential oil-yielding plants, medicinal plants, fibre plants, useful trees and shrubs, etc

Dr. Hugh Francis Clark Cleghorn,

M.D., LL.D., F.R.S.E., F.L.S.

DOCTOR Cleghorn was born in Madras on August 9, 1820, his father then being Administrator-General in the Supreme Court. Brought up at Stravithie, Doctor Cleghorn as a boy was trained to rural pursuits and rendered familiar with agricultural routine, and these early lessons no doubt led to that love of flowers and trees which became so pronounced in his after life. On leaving College in 1837, he was apprenticed to Professor Syme for five years, and held in the last year the position of one of the house surgeons of Edinburgh Royal Infirmary.

After graduating in 1841, Doctor Cleghorn proceeded, at the age of twenty-two, to Madras, where he was attached to the Madras General Hospital to study Indian diseases, and in this post, which entailed a life of constant marching here and there with regiments, he had many opportunities for studying the native languages and of extending his botanical knowledge. In 1848, he returned home on sick leave on the Sutlej.

After a short residence in Great Britain, during which he assisted in the preparation of the catalogue of raw products for the great Exhibition of 1851, Doctor Cleghorn returned to India. His attainments in botany had by this time attracted attention, and he was appointed Professor of Botany at Madras. In 1855, the Governor of Madras, Lord Harris, requested Doctor Cleghorn to undertake the task of organizing a Forest Department. He visited Burmah and other parts of the country in connection with his enquiries, and presented a preliminary report to the Government embodying the scheme for organizing a Forest Department which afterwards became so important in India.

Conservation of Forests

In 1861, Doctor Cleghorn returned to Scotland and married Mabel, daughter of the late Mr. Charles Cowan of Penicuik, and formerly M.P. for Edinburgh. On his return to India, he and Sir D. Brandis were appointed Joint Commissioners for

the Conservation of Forest; and at the requset of Lord Canning, Governor-General, Doctor Cleghorn spent three years in examining the forests of the Himalayas, including Cashmere and the Trans-Indus territory. Through such labours a systematic plan of conservation and management was instituted. In 1867, when Doctor Brandis returned home, Doctor Cleghorn acted as Inspector-General of Forests. Finally, in 1869—his father having died in 1864, leaving the family estate to him—Doctor Cleghorn retired from the Indian Service.

At Glascow University

On his return to Scotland, Doctor Cleghorn, on account of the serious illness of Professor Walker Arnott, was unexpectedly called upon to conduct the botany class in the University of Glasgow, and gave a complete course of lectures on systematic botany. They were much appreciated. Settling at Stravithie, he subsequently devoted himself to the life of a country gentleman taking his share in the management of local business and endeavouring to forward every philanthropic movement in the country. As a Justice of the Peace and a prison visitor, he was especially interested in efforts to give discharged prisoners a start in life

Doctor Cleghorn's collections—1853.

again. His favourite pursuits were not neglected, and among the first things he did was to plant in the grounds at Stravithie a collection of rare pines and shrubs which, since they have grown up, have been considered worthy by the botanists and arboriculturists of special merit.

Doctor Cleghorn was a member of the Edinburgh Botanical Society and president for several years of the Royal Scottish Arboricultural Society, by the members of which he was held in the greatest love and esteem. In 1885, the University of St. Andrews bestowed on him the honorary degree of Doctor of Laws, and in 1888 a large number of his friends presented him with his portrait in appreciation of his service to the cause of arboriculture in India and in this country. The sum of £200 was, at his request, devoted to forming a Hugh Cleghorn Forestry Library in the Museum of Science and Art in Edinburgh. In private life, Doctor Cleghorn, quiet, gentlemanly, and unassuming in his ways, was greatly esteemed by all with whom he came into contact. His death took place, at his estate, Stravithie, on the evening of May 16, 1895.

(Extract from the *Indian Forester*, Volume XXI—1895.)

Doctor. Cleghorn's collections—1853.

Life Sketch of Dr. Charles Alfred Barber

(10th November 1860—23rd February 1933)

DOCTOR Charles Alfred Barber was born in South Africa in 1860 where he spent the first ten years of his life. He received his early education in England at New King's Wood School, Bath. His love of nature made him decide on a scientific career. After taking his B.Sc. degree in London, he proceeded to Germany where he came under the inspiring influence of botanists Strasburger, Schmitz and Schimper.

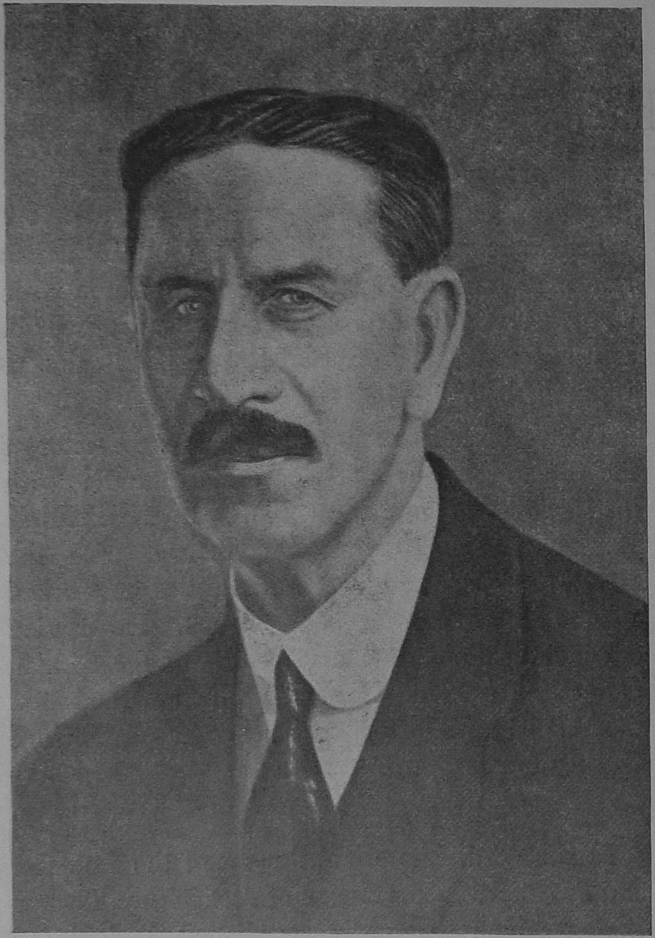
A Cambridge Scholar

On return from Germany in 1884, Doctor Barber entered Christ's College, Cambridge, and passed both parts of the Natural Science Tripos with first-class honours. After serving as Demonstrator in Botany for some time, he took appointment as Superintendent of Agriculture in the Leeward Islands in West Indies, where he first came into contact with the sugarcane plant, the plant to which he devoted so much attention during his later years and practically till his death. When the post was abolished in 1895 he had to return to England. After serving for three years at the Royal Engineering. College, Cooper's Hill, as a successor to Prof. H. M. Ward, he came to India in 1898.

Doctor Barber was appointed first as Director of the Botanical Survey of Southern India with instructions to prepare a Flora of the Madras Presidency. He was then connected with the Herbarium. In addition to his duties he worked on the diseases of economic crops. He carried out investigations on the Haustoria of the Sandal, *Canjera*, *Olax* and *Ximernia* which earned him the degree of Doctor of Science of Cambridge University.

Notable Contributions

In 1908, with the establishment of the Imperial and Provincial Departments of Agriculture, Doctor Barber joined the newly established Agricultural College at Coimbatore and was placed in charge of



Dr. C. A. Barber, C.I.E., Sc.D.

botanical, entomological and mycological sections. His work was devoted to a study of the economic crops of the Presidency wherein he made notable contributions. During this period, he was interested in the collection of specimens for the Madras Herbarium. A number of new species have been described by him. When the Government of India established the Sugarcane Station at Coimbatore in 1912, he was appointed the first Sugarcane Expert. During the short period of six years he was at the helm of affairs, he devoted his energies to the various aspects of the sugarcane crop. His detailed and painstaking studies of the Indian canes is a classic and has been placed on record in the various publications of the Memoirs of the Department of Agriculture in India.

Work at Coimbatore

He laid the foundation for the efficient breeding work now done at Coimbatore as also the foundation for an efficient sugar industry as we witness today. His earlier work in combating the red-rot menace by introduction of new resistant varieties from abroad won appreciation. He retired from service in 1918 and settled in England.

The characteristic feature in him was an intense devotion to duty and consentration on detail. He

Dr. Barber's Contributions

By *Dr. T. S. Venkataraman, D.Sc.*

LET me mention first that, but for the powerful and persistent efforts of Doctor Barber, there was a good chance of the Madras Herbarium remaining in Madras. There were powerful influences working for its location in Madras. It may be said that the Herbarium moved to Coimbatore because Doctor Barber himself chose to move to the Agricultural College at Coimbatore. Doctor Barber was greatly attached to the Herbarium and took delight in attending to even the minutest details. I remember the delicate and almost affectionate manner in which he used to carry about the Herbarium sheets. His monumental work on the Sandalwood-haustoria will long be remembered by the scientific public all the world over.

A Strict Disciplinarian

The late Doctor Barber was a systematist, not only with reference to the vegetation around him, but also with regard to his daily work. He used to go to Kotagiri every year for holiday. He used both the upward and downward journey to the mountain by systematically collecting " Epiphytes and saprophytes " from definite regions of his journey each time and the notes ran " from the fifth to the tenth mile " and the staff who had served under him came to occupy responsible positions in the department in subsequent years and their success was partly due to the rather unpleasant training they had under him. He never undertook any work which he did not finish and none which he did not adorn. Even after retirement, till he fell ill in 1932, he was contributing articles on sugarcane giving his experience and views. " These expressions of opinion were always given with painstaking care, for unless Barber could do a thing well, he preferred not to take the job at all." " He definitely exhibited many of those characteristics which distinguished those, who before science had gained a position among the accepted careers open to youth, were attracted to its study by an innate love of nature."

neither spared himself nor his staff whom he used to order about enforcing the strictest discipline.

Though Doctor Barber started his official career in India as a Systematic Botanist, the then conditions in the department placed him in charge of other economic work—connected directly or indirectly with plant life in the forests or in the cultivators' fields. At one time he combined in himself the functions of the Plant Mycologist and the Plant Entomologist besides the teaching work at the Agricultural College. The Government Agricultural Station at Samalkot in the Godavari district was originally started by him to fight out red-rot in the sugarcane crop which had then broken out there in an epidemic form. With his previous West Indian experience in sugarcane, he utilized the collection of Mauritius sugarcane in the Vizianagaram gardens, to keep down the disease. Later he had to turn his attention to other crops like the groundnut at the Palur Agricultural Station and Pepper at the Taliparamba Station. In every one of these lines his capacity for thorough and detailed studies gave him success.

Early retirement

His greatest contribution to Indian Agriculture, however, flowed from the present Sugarcane Breeding Institute at Coimbatore which he founded in the years 1911-12. He did not live to see the full fruition of his labours in the sugarcane line as he had to retire and hand over his half-finished work to his Indian successors. He did the first scientific classification of the different types of sugarcane in our country and it redounds to his credit, that his classification based at the time on morphological and field characters, has since been fully confirmed by cytological methods which were but in their early stages at that time.

During the whole of his useful career he spared neither himself nor his staff in enforcing discipline, the scientific method of approach to problems and very hard work. During his tours across the Western Ghats he had to live on monkey's flesh, it was said and he used to collect botanical specimens by shooting down the needed branches when such were not available by other means. He was fond of applying the scientific method to all his activities and used to lecture on the then popular games and the scientific methods of playing them. He did not believe in Indian talent ever rising equal to his own British standards but even in this regard, a slight change was noticeable as the years rolled on.

A Note on Mr. James Sykes Gamble

MR. Gamble joined the Indian Forest Service in 1871 after training at the French Forest School, Nancy. He started his service in Burma but in 1872 was transferred to Bengal and in 1882 to Madras as Conservator of Forests. In 1890, Mr. Gamble was appointed Director of the Forest School at Dehra Dun and retired from the service in 1899. His interests in wood structure were aroused when a student at Nancy and the difficulty of identifying the various trees he came across led him naturally to systematic botany.

Mr. Gamble started collecting specimens in Darjeeling in 1873 with the object of naming his timber specimens and published a list of the trees, shrubs and large climbers of Darjeeling in 1878. He left Bengal in 1882 but published a revised edition of his Darjeeling list in 1896. His Manual of Indian Timbers, the first edition of which was published in 1881, was mainly a compilation of descriptions of Indian timbers, collected for the Paris Exhibition of 1878, prepared by a committee consisting of Messrs. Brandis, Gamble and Smythies.

For the second edition nearly 2,000 additional specimens were examined, the original descriptions revised and additional species added by Mr. Gamble. The work was reprinted from the second edition with a few additions and corrections in 1922.

Ardent Botanist

Mr. Gamble was an ardent botanist and collector. He founded the Forest School Herbarium by presenting a set of his own plants collected in Darjeeling and Madras and added numerous specimens collected while Director of the Forest School. In 1896 he published " the Bambusae of British India " in the " Annals of the Royal Botanic Gardens ", Calcutta, Volume VII, and published

accounts of the bamboos of the Philippine Islands in the "Philippine Journal of Science", Volumes V and VIII. The Lauraceae was another family in which he was specially interested and he described the Chinese species in Plantae Wilsonianae, Volume II.

In 1903, Mr. Gamble collaborated with Sir George King in his "Materials for a Flora of the Malaya Peninsula" assisting with this work from the Caprifolianceae to the end of Gamopetalae. This completed the "Materials" in 1908. In 1912 he took to the preparation of the Flora of Madras and completed up to Parts VII which was published in 1925 very shortly after his death. In a private letter of June 1925 he mentioned having reached Euphorbiaceae and it is much to be regretted that he was not spared to finish this Flora. He also mentioned a contemplated revision of the Bambusae with descriptions of some additional species from Burma, a task for which he was exceptionally well qualified.

During the long period of his residence in Hampshire, he occupied his time with forestry and botany. His small estate near East Liss was very carefully looked after and small plantations of a number of species were laid out and tended by Mr. Gamble and his wife. He also had some experimental areas where he studied the silviculture of the Scotch pine. Ten days in every month were spent at Kew where Gamble had for years been engaged on the Flora of Madras and of Malaya. It was his own opinion that the busy life he led had kept him alive and well for more than twenty five years after he left India. He died at his home Highfield, East Liss, Hants, England, on 16th October 1925 at the age of 78.

(Extract from *Indian Forester*, Volume LII, 1926.)

Sri K. Rangachariar : A profile

By *Sri P. S. Jeevanna Rao*, M.A.

I HAVE great pleasure in writing the following notes about my respected chief Sri K. Rangachariar, known by his family name as Kadambi Rangachariar, under whose very eyes I worked as assistant for nine years, i.e., from March 1914 till his retirement in 1923. Though I began the A B C of Botany in my B.A. class (1908) under Professor Fyson of the Presidency College, Rangachariar was my botanical guru since 1914. I admired him for his fine attainments, his full and all-round knowledge of Botany, for his untiring work as author late in life and other qualities. When recommending his book "Manual of Botany" about 1915, Mr. D. T. Chadwick, the then Director of Agriculture, observed "Rangachariar was one of the best botanists if not the best in India."

The following notes may give some estimate of his true worth :—

Personality.—Of somewhat short stature with his head bent downwards, fair, bright and shining face with his Vaishnava caste mark, he was a compelling personality whether in Indian or English dress. He wore thick and powerful glasses, his eyes evidently weakened due to his constant use of lens and microscope.

Academic distinctions.—He was said to be the only first class in M.A., in Biology and Botany till his time and many years afterwards.

Career.—He began his life as a teacher in the Municipal School, Anantapur. Later for many years he was an Assistant in the Madras Museum for which reason he was called Museum Rangachari. Though styled as Herbarium Keeper he had specialized in fields of Anthropology and Ethnology and assisted the then Superintendent of the Museum, Doctor Thurston, in his book "Castes and Tribes of South India" when he gained a knowledge of the hill tribes of India, recording their voices by means of the phonograph. His services in this direction were appreciated by the Government, which awarded him title of Rai Bahadur. He was later Lecturer in Natural Science in the Teachers' College, Saidapet, and acted

as Professor of Botany in Presidency College, Madras. About this time, the Government Botanist, Mr. C. A. Barber, was in charge of Botany teaching and economic work with his able assistants, Sir T. S. Venkataraman and Mr. C. Tadulingam. Doctor Barber wanting to be relieved of teaching and systematic work, so as to take up sugarcane research, knowing the superior qualifications of Rangachariar, was instrumental in getting his services to the department. Rangachari was first Lecturer in Botany, then Lecturing and Systematic Botanist and finally Government Lecturing and Systematic Botanist.

Author of Botanical Books.—It is as an author of botanical books that Rangachariar must be gratefully remembered. His earliest works at Madras were attractive pamphlets on "Bean Plant" and a Tamil work on plant life for the use of school teachers. In this respect he was really the giver of Botany in South India. His later works at Coimbatore were "Manual of Botany", "Handbook of Practical Botany", "Handbook of South Indian Grasses" and "Handbook of Botany for South India". He was a good photographer and the first one to introduce in the college the Photomicrographer and the combined projection apparatus.

Sri K. Rangachari, M.A., L.T.

Herbarium and Systematic Botany.—About his contributions in Systematic Botany the hundreds of sheets written in his hand will bear witness. I may say that from 1914 he devoted himself to writing books and bringing botanical teaching up to date. He described a few new species during his service here.

Teacher.—Rangachariar laid great stress on the practical side of Botany encouraging powers of observation in the students, and his practical classes were a trial to the students. He lectured to the students only once in a way. His older students will remember his peculiar mannerisms 'so that' in his lectures.

I may finally add that Rangachariar was a self-made man who rose to eminence by his own merits without any adventitious aids and did very substantial work in the department both in teaching and Systematic Botany. One outstanding quality of Rangachariar is that he will never take credit for what others have done. Never will he lend his name as senior author for any contribution by his subordinates. The Government rightly recognized his services and awarded the title of Diwan Bahadur.

The oldest specimen, dated 1797.

Life Sketch of

Sri C. Tadulinga Mudaliar,

By *Sri S. N. Chandrasekhara Ayyar*, M.A.

AMONG those who built up the Madras Herbarium, to Sri Tadulinga Mudaliar goes no small credit. It was not in vain that the first place was given to him in Botany in the B.A. degree examination of the Madras University in 1900 and it is no wonder he fully justified the training he had under the famous Biologist Dr. (later Sir) Alfred Bourne, F.R.S., and grew up to be an eminent Systematic Botanist.

Sri C. Tadulinga Mudaliar was born in October 1878 in Madras and belonged to a noble family. It is a pleasure for me to record his life, though in brief, as Sri Tadulingam and one of my brothers were classmates and collegemates and our families have been good friends for several generations.

Doctor Barber selected Sri Tadulingam specially and put him in charge of the Herbarium in 1901. Along with the Herbarium, Sri Tadulingam moved from Ootacamund to Madras and from Madras to Coimbatore where the Herbarium continued to stay permanently for very good reasons. In Coimbatore, Sri Tadulingam worked steadily at the Herbarium for very nearly twenty-five years. With his strenuous work, the Herbarium grew large, from day to day. From Ganjam to Cape Comorin, Sri Tadulingam has explored practically all the floristic regions, both in the plains and in the hills, and the bulk of his collections had supplied the material for the Madras Flora by Gamble. During his work, Tadulingam discovered several new species which were published from time to time in leading botanical journals. He was like Rangachari an authority on grasses. He made a special study of the weeds of South India. He is the joint author of "A Handbook of Some South Indian Grasses" (1921) and "A Handbook of Some South Indian Weeds" (1932), both of which are acclaimed to be books of a very high order and are serving a useful purpose to students and research workers in the botanical field. His paper on "Madras Flora" read before the Indian Science Congress, Madras,

in 1915 is illustrative of the depth of his knowledge in Systematic Botany.

I will be failing in my duty if mention is not made about his other activities. He was a very good and genial teacher. He taught agricultural botany and evinced great interest in horticulture. The several well-grown trees in the College estate were all planted by him. As a born good soul he was very much loved by one and all, irrespective of caste, creed, community, nationality, age, sex or position in life, high or low. Everybody remembers Sri Tadulingam, only with his smiling face and nobody has ever seen him frown. As Goldsmith could put it, if at all he erred, he erred too much on the right side.

Sri Tadulingam rose to be the Principal of the Agricultural College, a favour rarely conferred on an Indian and he retired from this coveted post in October 1933. He was a wholesome combination of a bright intellect with a large heart. With his head, he became a great Systematic Botanist and with his heart he served others and rejoiced. He was of a pious and loving temperament. He made great sacrifices, to help others. He will ever be remembered by posterity and emulated for his good life and hard work both in office and out of it.

Sri C. Tadulinga Mudaliar.

A Note on

Sri P. S. Jivanna Rao

By *Sri S. N. Chandrasekhara Ayyar, M.A.*

SRI P. S. Jivanna Rao is a native of Tanjore and was born in 1887 in a middle-class intellectual family. He is a self-made man and he took his M.A. degree in 1918.

A good Systematic Botanist that he was, he helped considerably both Sri Rangachari and Sri Tadulingam in all their work. Sri Jivanna Rao's talents lay more in plant physiology. He worked on the spike disease of sandal, vegetative propagation in relation to sterility and conducted physiological studies in water-hyacinth, loranthaceae, cotton boll shedding, etc. He published several articles of research interest from time to time in the various botanical journals. He was good at grass work. He was also a good teacher and did teaching throughout his service.

Regarding his personal qualities Sri Jivanna Rao was of a quiet, retiring nature. He was a Theosophist and took much interest in music and poetry. He was known to be a strict disciplinarian.

He was in charge of the Herbarium for a short period during 1942, just before he retired from Government service.

Sri P. S. Jivanna Rao, M.A.

Life Sketch of

Sri S. N. Chandrasekharan

By *Sri P. S. Jivanna Rao, M.A.*

I HAVE known Sri S. N. Chandrasekharan since 1920 when he joined as Assistant Lecturer five years after me. He continued the traditions of the section faithfully, to some extent Rangachari's, on the lines of authorship by revising Rangachari's "Handbook of Botany" twice and publishing a book on "Cytogenetics and Plant Breeding." Along with a cheerful smiling face he was very helpful to students, colleagues and superiors. By his command of good style and fluency he was a very successful teacher.

Prior to his joining the department he was working as Botanical Assistant in the Madras Museum. During his short stay there he prepared a "Catalogue of Economic Products in the Museum" which was the first published one on the subject. He was a student of Professor Fyson on whose recommendation he was taken in the Department as Assistant Lecturer in Botany on a special cadre. He gave great velocity to the economic aspects of the sectional work, viz., fodder grasses, legumes, green manures, etc. He retired in August 1950 after serving the department for over thirty years. As an officer he was known to be very kind and gave all facilities and encouragement to his subordinates.

The Blatter Herbarium, Bombay

By

Fr. H. Santapau, S.J., F.N.I.

(St. Xavier's College, Bombay.)

The Herbarium of St. Xavier's College, Bombay, in 1941 was renamed after its founder *The Blatter Herbarium.* How the herbarium was started in the first instance, its development and progress and present state, will form the object of these notes.

Somewhere about 1906 or 1907, the Rev. E. Blatter, S.J., my predecessor-in-office as Professor of Botany in this College, received a large consignment of herbarium specimens from C. E. C. Fischer, from the Coimbatore Herbarium ; on such specimens Blatter published one of his earliest papers on the flora of India. (For the list of publications, please see bibliography at the end of this paper.) This study made a deep impression on Blatter, and convinced him of the urgent necessity of starting a herbarium in Bombay. In a way, therefore, our herbarium owes its inspiration to the Coimbatore Herbarium ; this is why we consider ourselves privileged to be in a way the children of Coimbatore, and this is why Blatter Herbarium and all its research workers wish to associate themselves with the present Centenary Celebrations.

The Blatter Herbarium does not and cannot claim to be as distinguished as the parent institution ; all the same it has helped to continue the tradition of Coimbatore in this State of Bombay; our herbarium and the research workers associated with it have helped to keep up a school of intense field and laboratory study in Plant Systematics.

The Explorations conducted from the Blatter Herbarium from its foundation to the death of Blatter (1934).

In the first few years after its foundation, our herbarium concentrated on the collection and study

of more or less local plants. In the words of C. McCann, one of the surviving assistants of Blatter, it was imperative that a large collection of plants should be gathered as soon as possible, until a representative nucleus of Bombay plants were made available for study. When local plants were considered to be sufficiently well represented in the herbarium, fields farther away were undertaken by Blatter and his assistants, either together or separately. The results of such explorations have been published in numerous books and papers. The main parts explored and the publications on the same during this first period of activity are the following :—

1. As the result of the continued study of the local flora in the neighbourhood of Bombay, Blatter published his first floristicwork on the Mangrove of Bombay in 1905.

2. The flora of Panchgani formed the object of study of Blatter and of some of his research students, mainly the former ; the results were published in 1909.

3. Early in his career, Blatter was deeply attracted to such parts of Bombay Presidency as had not been explored previously ; Cutch was one of such places. After a month of intense work in the field, Blatter published his paper on the flora of Cutch in 1909.

4. During the holidays some of our professors used to go to Mount Abu for a rest. Blatter and McCann spent several months on the spot and made extensive collections ; use was made of the information gathered there in the *Revision of the Flora of Bombay*, undertaken several years later. I have been informed that both workers contemplated the

The oldest specimen, dated 1797.

writing of the flora of Abu but were only prevented by the death of Blatter. In our herbarium, we have a large card index catalogue of the plants of Mount Abu on which the coming book was going to be based.

5. In summer 1916 Prof. F. Hallberg, one of Blatter's most constant companions in the field, was sent to Kashmir where he made a very large collection of flowering plants. On this collection, Blatter based his book, *Beautiful Flowers of Kashmir*, which appeared in 1927-28.

6. December 1916 was spent by Blatter and McCann in Purandhar and its neighbourhood collecting particularly grasses, many of which have been mentioned in *Bombay Grasses* and lately have been included in the Flora of Purandhar.

7. In May 1917, Blatter, Hallberg, D'Almeida and other assistants went to the High Wavy Mountain, Madurai district; their large collections seem to have been distributed rather freely to other herbaria, for their number in Blatter Herbarium is rather small. Several papers were published on this expedition, but the bulk of the plants remains still to be worked out in detail.

8. In October 1917, McCann went to Igatpuri on the Western Ghats of India, whilst Blatter himself went to Khandala. Their collections have been worked out and embodied in the *Revision of the Flora of Bombay* and in *Bombay Grasses*.

9. December 1917 saw Blatter, Hallberg and McCann touring through West Khandesh; their results have been embodied in the *Revision*.

10. North Kanara was explored by McCann and Hallberg in October 1919. The results of this outing are mentioned in the *Revision*, but no special paper was published on the subject.

11. October 1922 was one of the more adventurous trips of Blatter and his assistants; they spent the month sailing along the Indus Delta. T. S. Sabnis later studied the anatomy of the plants while Blatter and McCann concentrated on the Taxonomy of the same. Their results were only published in 1927-29.

12. The Indian Desert in the neighbourhood of Jaisalmer was studied in October and November 1917; the results of the outing were published in 1918-1921.

13. In 1924 Blatter retired from Bombay and went to settle in Panchgani; during the ten years until his death he published a large number of papers on the flora of the Western Ghats. Most of the original collections are either in Blatter Herbarium or in the collection of C. McCann, at present in Wellington, New Zealand.

14. In the summer 1930 Blatter, J. Fernandes and G. Palacios visited Waziristan and made extensive collections; on this occasion Blatter suffered a fall, from which eventually he died a few years later. The results of this expedition have been published in several papers, which are listed in the Bibliography.

In addition to these expeditions and the papers discussing their results, a number of papers or books were published by Blatter or his assistants on various topics of taxonomic importance. The principal papers of books are listed in the bibliography.

Explorations conducted from the Blatter Herbarium from 1940 *to the present, August* 1954.

In November 1940 the present Director, H. Santapau, took charge of the Biology Department, St. Xavier's College, Bombay, and of the Blatter Herbarium attached to the same. The first few years of this second period were spent in trying to rearrange the Herbarium, and repair at the same time much attention was given to the preparation of a complete catalogue of all the specimens in our collections. This catalogue has been of great service to research workers, who at once can see in the catalogue which plants of any particular genus or family are to be found in the Herbarium shelves; the catalogue has been used in the preparation of the various papers that have issued from the Herbarium from 1940.

The beginnings of this period saw much activity spent in the study of the local flora; Blatter had intended bringing out a flora of the islands of Bombay and Salsette, and it was only his departure from Bombay that prevented him from carrying this into effect. In this way through local exploration it was possible to replace any specimens from Blatter's own collections that had become damaged or in any other way needed replacement. Other places farther afield were also explored, as will be seen in the following list.

1. Khandala on the Western Ghats of India. Blatter's work was resumed and continued until the publication of the *Flora of Khandala* in 1933. In Blatter Herbarium probably no other part of

India is better represented than Khandala and its neighbourhood, there being not less than 20,000 specimens from Khandala alone.

2. Elephanta Island has been explored in part, and the complete work will take many years ; the main difficulty is that during the monsoon period it is very difficult to find transport to the island. The work, however, is progressing.

3. In May 1945, H. Santapau and J. Fernandes, the latter one of Blatter's assistants, botanized in Baluchistan, with a view to the preparation of the flora of the province ; several thousand specimens were collected, but the work had to be given up at the time of partition.

4. From October 1944 to November 1951 the flora of Purandhar, Poona district, was explored ; during the last War, Purandhar became an internment camp for enemy aliens, several of whom gave great help in the collection of plants all through the year. The Flora of Purandhar is ready, and has been accepted by the Records of the Botanical Survey of India.

5. In October 1945, H. Santapau and P. V. Bole explored the then State of Nawanagar, in Kathiawar ; the exploration of the present State of Sourashtra has been continuing up to the present. In this work the Sourashtra Research Society, Rajkot, has been of great help, and it is under its auspices that exploration has been conducted in the last three years.

6. From November 1950 the flora of Mahabaleshwar has been under study ; Dr. E. A. Hakim, Ph. D., Professor P. V. Bole and H. Santapau have been conducting the work and hope soon to complete it.

7. A few years ago the Government of Bombay established the first National Park in the State, at Borivli, in the island of Salsette, about 20 miles north of Bombay. Botanically the spot is very interesting, and many visitors show great keenness to know something about the plants of the Park. Several research students have been put in charge of the Flora of the Krishnagiri National Park, Borivli, and it is hoped that with one or at most two years we shall have the book ready for the public.

8. The Dangs forest near Surat, Bombay State, has been under study for several years ; lately the Gujerat Research Society has shown much interest in the work, and is now going to publish our results in the near future.

Other Systematic Work of the Blatter Herbarium.

Due to the fact that all our plants are duly catalogued, we receive many inquiries from various parts of Bombay State on interesting or important plants, their occurrence and distribution in the State, their abundance or scarcity, etc. We have tried our best, and Blatter Herbarium has been doing good work in this respect, especially now that the National Laboratories require precise and definite information about the plants of Bombay.

Many of the Bombay merchants dealing in plant material have often applied for help in the identification, etc., or their wares. In this line, too, the Blatter Herbarium has done good service.

Questions on nomenclature, translation into Latin of new taxa of plants, etc., are also attended to in the Blatter Herbarium.

One of the more notable services that the Blatter Herbarium has done, of late, is the distribution of Bombay plants among foreign herbaria; in this way we have helped to make the botany of India better known in foreign parts. Among the more frequent correspondents to whom Bombay plants have been sent in foreign countries must be mentioned, Kew, Edinburgh, Leiden, Madrid, Arnold Arboretum, Missouri, New York, etc. We have also contributed to Indian botany by the loan of herbarium material to various Indian institutions for the preparations of papers or monographs on Indian plants. We are happy and proud that in our small measure we have helped to make Indian botany better known at home and abroad.

The collections in the Blatter Herbarium.

1. *Collection of E. Blatter and assistants.*—Many of the herbarium sheets of the first period of activity of our institution do not carry the name of the collector; very often the material was collected by Blatter and, or McCann, Hallberg, Sabnis, D'Almeida, etc. All the plants gathered in the exploration of a particular place were given a consecutive or serial number. When one of the assistants was sent on a particular mission, then the herbarium sheets were numbered according to the serial number of the person concerned, and his name appears on the herbarium sheet. Taking all such sheets as forming the *Blatter collection*, there are over 1,00,000 in Blatter Herbarium.

2. *Collection of H. Santapau.*—About 20,000 specimens form this collection. Special attention has been paid for years to the gathering of individual species in every stage of development, from about the same spot; attention has been paid to the

correct scientific display of the plant and all its parts, and if possible to the artistic presentation of the same on the herbarium sheets.

3. *The Sedgwick collection.*—This is a very important set of plants covering particularly well the districts to the south of Bombay State. L.J.Sedgwick for many years was an I.C.S. stationed at Dharwar, in North Kanara; his holidays were spent in the jungle collecting plants and other information. Shortly before his death Sedgwick passed his collection to Blatter. These specimens are a model of neatness and of careful preservation; they are of great value especially as they cover those districts of Bombay which were not worked out by Blatter. The collection consists of over 7,000 specimens.

4. *The Acland collection.*—The Rt. Rev. R. D. Acland, formerly Bishop of Bombay, on the eve of his retirement from India, presented the whole of his herbarium to the Blatter Herbarium, as he said to the author " in token of gratitude for the constant help which he had received from Father Blatter particularly at the beginning of his (Acland's) botanical studies in this country ". As Bishop of the Church of England, Acland had to move about Bombay State visiting his parishes and mission stations; in the course of such visits he made it a point to find some time to go into the field and study the plants of the locality. The collection consists of several thousand specimens, and is of interest because it covers those districts which have not been explored by the personnel of the Blatter Herbarium or by Sedgwick.

5. *The Lisboa collection.*—Dr. J. C. Lisboa was for many years Professor in the University of Bombay; he paid particular attention to economic plants, especially grasses. Lisboa's specimens are mounted in solid folio volumes, of which there are several in Blatter Herbarium.

6. *The B. B. Mundkur Mycological Herbarium.*—Dr. B. B. Mundkur about three years before his untimely and sudden death in 1953 presented his large mycological herbarium to the Blatter Herbarium; the collection is particularly valuable, as it contains practically the types of the very large numbers of novelties discovered by Doctor Mundkur.

7. In addition the Blatter Herbarium contains numerous smaller collections by students of Blatter or of the author, on which some interesting theses have been built. There are many sheets from Europe and America obtained either directly by Blatter or Santapau or by exchange with some foreign institutions.

The Library attached to Blatter Herbarium.

For many years during the life of the founder, many journals and books in Taxonomy were gathered ; to these the present director has kept adding regularly, so that at present we can show the most complete library of books, old and new, on Taxonomy within the boundaries of Bombay State. This library has been of great help in solving the many taxonomic problems that are brought to us from many parts of India. In 1944 the Rev. J. F. Caius, S.J., presented to the same library his very complete collection of books on Indian medicinal plants and others.

On the occasion of the Centenary of the Coimbatore Herbarium we feel proud to associate ourselves with the Madras botanists in honouring an institution, from which our own Blatter Herbarium received its inspiration in the first instance. We have tried in our small measure to do for Bombay what Coimbatore has done for Madras in a much more generous scale. Under the inspiration of our spiritual mother, we, the director and research workers of the Blatter Herbarium, will continue our efforts to make the flora of India better known at home and abroad.

APPENDIX.

List of the more important publications from Blatter Herbarium.

Blatter, E.

1905 The Mangrove of the Bombay Presidency and its Biology. *Journ. Bombay Nat. Hist. Soc.* (for short JBNHS) 16 : 644-656.

1908 Contributions to the Flora of North Coimbatore. (From materials supplied by C.E.C. Fischer). *JBNHS* 18 : 390-429.

1908 The Ferns of the Bombay Presidency. *JBNHS* 18 : 599-648.

1908 On the Flora of Cutch. *JBNHS* 18 : 756-777, 1908 ; 19 : 157-176, 1909.

1909 The Flora of Panchgani. *JBNHS* 19 : 314-332.

1910 The Palms of British India and Ceylon, indigenous and introduced. *JBNHS* 20 : 33...........In this series 20 parts in all were published, between 1910 and 1925. The series was published in book form by Oxford Univ. Press in 1926.

1911 A Bibliography of the Botany of British India and Ceylon. *JBNHS* 20 : lxxix-clxxxv. In all 1,508 papers were listed in this bibliography.

1926 Revision of the Flora of the Bombay Presidency. See below under *Blatter & McCann.*

1928 Beautiful Flowers of Kashmir. *London,* 1928.

1928 A List of Orchids with some new species from the High Wavy Mountain (Madura District). *JBNHS* 32 : 518-523.

Blatter, E.—cont.

1929 Mosses of the Bombay Presidency, the High Wavy Mountains and Mount Abu. *JBNHS* 33 : 869-889.

1929 The Indian Bamboos brought up to date. *Ind. For.* 55 : 541-559.

1929 The Flowering of Bamboos. *JBNHS* 33 : 899-921, 1929 : 34 : 135-141, 447-467, 1930.

1930 New species of Indian Plants. *Journ. & Proc. As. Soc. Beng.* (n.s.) 26 : 339-366.

1930 Plantae novae Waziristanenses...... *Journ. Ind. Bot. Soc.* 9 : 199-207.

1933 New Plants from Waziristan. *JBNHS* 36 : 477-484.

Blatter, E. & *J. F. R. d'Almeida.*

1922 The Ferns of Bombay. *Bombay.*

Blatter, *E.*, *J. F. Caius* & *K. S. Mhaskar.*

1933 Indian Medicinal Plants......By Lt.-Col. K. R. Kirtikar......Major B. D. Basu......Second edition in four volumes. Edited, revised and mostly rewritten by E. Blatter,......J. F. Caius......and K. S. Mhaskar. (There is no date on any of the volumes but the preface is dated September 1, 1933). *Allahabad.*

Blatter, E. & *J. Fernandes.*

1933 The Flora of Waziristan. *JBNHS* 36 : 665-687, 950-977, 1933 ; 37 : 150-171, 391-424, 604-619, 1934.

Blatter, E. & *F. Hallberg.*

1918 Contributions towards a flora of Persian Baluchistan and Makran. From materials supplied by Capt J. E. B. Hotson......*JBNHS* 25 : 723-739.

1918 The Flora of the Indian Desert (Jodhpur and Jaisalmer). *JBNHS* 26 : 525......(A series of eight papers published between 1918 and 1921).

1921 Species Novae Indiae Orientalis. Decas I. *Journ. Ind. Bot.* 2 : 44-54, ff. 1-5.

Blatter, E., F. Hallberg, C. McCann.

1919 Contributions towards a flora of Baluchistan. From materials supplied by Col. J. E. B. Hotson...*Journ. Ind. Bot.* 1 : 54...In all seven parts were published between 1919 and 1920 ; the series was reprinted in book form.

Blatter, *E.* & *C. McCann.*

1926 Revision of the Flora of the Bombay Presidency. *JBNHS* 31 : 547...In this series 27 parts were published ; nos. 1-2, 12-14, 20, by Blatter alone, the rest jointly with *McCann.*

1935 The Bombay Grasses......illustrated by R. K. Bhide. Scientific Monograph No. 5, Imp. Council Agric. Res.

Blatter, *E.*, *C. McCann* & *T. S. Sabnis.*

1927 The Flora of the Indus Delta. *Journ. Ind. Bot.* 6 : 31-47......In this series seven parts were issued.

Blatter, *E.* & *W. S. Millard.*

1929 Some Beautiful Indian Trees. JBNHS 33 : 624... In this series 14 numbers were issued ; they were published in book form in 1937.

Caius, J. F.

1935 The Medicinal and Poisonous Palms of India. *JBNHS* 37 : 917-941. Under the title "The Medicinal and Poisonous Plants of India", Caius published 26 papers in the same journal.

d'Almeida, J. F. R. & D. P. Mullan.

1925 Nephrolepis and Nymphaea. *Bombay*, 1925 ; third edit. 1937.

d'Almeida, J. F. R. & C. S. Ramaswamy.

1948 A contribution to the study of the Ecological Anatomy of the Indian Cyperaceae. *Bombay Univ., Botanical Mem.* No. 1, 1948.

Santapau, H.

1947 Notes on the Convolvulaceae of Bombay. *JBNHS* 47 : 337-354......This is a series which aimed at continuing the Revision of Blatter and McCann ; 6 families have been revised between 1947 and 1951.

1951 A contribution to the Flora of Simhagadh Hill, Poona District. *Poona Agric. Coll. Mag.* 41 : 270-284.

1952 Critical notes on the Identity and Nomenclature of some Bombay Plants. *JBNHS* 50 : 305-312...... This series is in course of publication ; 6 notes have been published in the same journal.

1952 The Acanthaceae of Bombay. *Univ. Bombay, Bot. Mem.* No. 2.

1952 Contributions to the Bibliography of Indian Botany. *JBNHS* 50 : 520-548, 1952 ; 51 : 205-259, 1953.

1952 Report of Work done under the auspices of the Saurashtra Research Society, for the Botanical Survey of Saurashtra.. *Ann. Rep. S.R.S.* 1952 : 9-20.

Santapau, H.—cont.

1952 Report of the Second Field Season in the Botanical Survey of Saurashtra. *Rajkot*, 1952.

1952 Report on the Third Field Season in the Botanical Exploration of Saurashtra. *Rajkot*, 1952.

1953 Plants of Saurashtra. A Preliminary List. *Rajkot*, 1953.

1953 Botanical Excursion to Mahabaleshwer, Bombay State, in India, August 1951. *Ann. Jard. Bot. Madrid* 11 (1) : 281-317.

1953 The Flora of Khandala on the Western Ghats of India. *Rec. Bot. Surv. Ind.* 16 (1).

Santapau, H. & M. B. Raizada.

1954 Contribution to the Flora of the Fir Forest in Saurashtra. *Ind. For.* 80 : 379-389.

The following papers have been sent to the publishers, but have not yet appeared :—

Santapau, H.

1951 The Flora of Purandhar. (Rec. Bot. Surv. Ind.)

1954 Annual Excursion of the Indian Botanical Society, Hyderabad, Deccan, 1954. (Journ. Ind. Bot. Soc.)

1954 Contributions to the Flora of the Dangs Forest. (Journ. Gujerat Res. Soc.)

1954 The Botanical Exploration of Saurashtra. (Ann. Jard. Bot. Madrid.)

Santapau, H. & M. B. Raizada.

1954 Contributions to the Flora of the Gir Forest in Saurashtra. (Ind. For. Rec.)

Indian and Burmese Polygala-Section, Chamaebuxus

By

Sri S. K. Mukerjee
(Indian Botanic Garden, Calcutta.)

Bennette in Hooker's Fl. Brit. Ind., Vol. I, 200 p. (1872) mentions one species of Polygala in the section Chamaebuxus Tourn., viz. *P. arillata* Buch-Ham. He treats Chamaebuxus paniculata Hassk. from Khasia as identical with P. arillata. Chodat in Mem. Soc. Phys. Hist. Nat. Genev. Vol. 31, recognises the validity of Hasskarl's species and gives it a new name, as *P. tricholopha*, the name P. paniculata having been pre-occupied. Merril and Chun in Sunnyatsenia, Vol. 2, p. 254 (1935) treats this species as distinct from P. arillata and have named it as P. Hasskarli not knowing perhaps that Chodat has already given it a new name. Kurz described a new species of Polygala of this section, viz., *P. karensianum* in Journ. As. Soc. Beng., Vol. 41 (1872), II, pp. 392. After the discovery of this species, two more species of this section of Polygala have been recorded from Burma of which one is common in Malyasia, viz., *P. venenosa* Juss., and the other is *P. globulifera* Dunn., known before from China. Among the specimens of P. arillata preserved in the Calcutta Herbarium; great variations are evidenced and in addition to this typical form a few distinct forms and varieties are distinguished. These are described below, as well as the other species of the section Chamaebuxus recorded from India and Burma.

Polygala arillata Buch. Ham. in Don Prod., Fl. Nep. 199 (1825); Hook. F. Fl. Brit. Ind. I, 200 (1872); Chodat in Mem. Soc. Phys. Genev. XXXI, 2: 94 (1893). Gagnep. in Suppl. Fl. Gen. Indochin I: 2,231 (1939).

Chamaebuxus arillata Hass, in An. Mus. Bot. Lugd. Bat. I, 153 (1863); Kurz in F. Fl. Brit. Burma I, 79 (1877).

C. arillata var. brachybotrys Hass. 1. c. 154.

C. arillata var. robusta Hass, 1. c. 154.

Erect shrub, 2-4 mtr. high. Leaves lanceolate, caudate-acuminate, acute at base, glabrous ; lamina

6-18 cm. long, 3.5-4 cm. broad ; petiole 10-12 mm. long. Racemes pendulous, terminal or axillary or extra-axillary, 6-15 cm. long or more ; flowers bright yellow ; bracts small, linear, caducous. Outer sepals 3 ; 2 smaller obovate, rounded at apex, 4 mm. long ; the other sepal concave or boatshaped, 6 mm. long ; wings obovate, gradually narrowed to the base, up to 14 mm. long, rounded at apex. Petals 3, yellow, united at the base with the staminal sheath ; the lower-most keel shaped crested with a tuft of linear segments. Stamens 8, in 2 equal groups, filaments free near the top. Ovary glabrous, style piliform at base, dilated above the middle, stigmatic lobes equal, superposed. Capsule suborbicular, up to 13 mm. in diam., notched at base and apex, margin winged ; seed black, globular, minutely hairy, 3-5 mm. in diam. ; aril conical, not lobed, reddish orange.

India : Nepal to Assam, alt. 1400-2800 mtr. ; S. India in the hills above 1,300 mtr.

Burma ; Siam, China, Indo chine.

form SCANDENS f. nov.

Frutex, 7-8 mtr. altis, ramuli scandentibus novellis puberulosis.

Tall shrub, 7-8 mtr. high, branches scandent, puberulous in younger parts. Leaves membranous, elliptic-lanceolate or lblanceolate, cuspidate acuminate, base decurrent to the short petiole. Flowers yellow.

Assam : Naga hills, Kohima 1100-2000 mtr., Prain, July 1886 (Type in Herb. Cal.) ; Naga hills, Kohima, Prain, Sept. 1886 ; Naga hills, Kywima, 2000 mtr. C.B. Clarke No. 41159.

form. KACHINENSIS f. nov.

Folia lanceolata vel linearolanceolata, 15-24 cm. longa, longe-acuminata, capsula majoribus.

Leaves 15-24 cm. long, lanceolate or linear-or linear-lanceolata, long acuminate, base rounded or acute ; petiole 8-18 mm. long. Capsule larger 15 mm. in diam.

Upper Burma : Kochin hills, Shaik Mokim, Nov. 1897 (Type in Herb. Cal.) ; Kajen Tap, N'Maikha, 700-800 mtr., S.M. Toppin R.A. No. 6159.

form. SIKKIMENSIS f. nov.

Planta crassiuscula, folia lanceolata vel elliptico-lanceolata, 10-19 cm. longa, inflorescentia breviora, capsulis margine nonalatis, semena sericeopilosibus Robust shrub. Leaves thinly coriaceous, lanceolate or elliptic-lanceolate, 10-19 cm. long. Racemes

shorter than the leaves. Flowers smaller. Capsule not winged ; seeds covered with fine long grey hairs.

Sikkim, Cave No. 6819 (Type in Herb. Cal.) ; Lachung, Sept. 1903, Major F. Y. Younhusband ; Debery Panee, Dr. K. Biswas, No. 5652.

Bhootan, J. Parkes, 1885.

form. REVOLUTA f. nov.

Folia margine revoluta, apice acuta vel breviter acuminata, semena glabberrima arillio multo operta.

Leaves thinly coriaceous, lanceolate or elliptic, acute or shortly acuminate, base cuneate, margin revolute, veins raised beneath, clearly anastomosing; upper surface glabrous, lower surface sparsely and minutely hairy on the nerves ; lamina 5.5 to 12.5 cm. long. Seeds glabrous, major portion covered by the aril.

S. India : Ootacamund, G. Watt, Nov. 1899 (Type in Herb. Cal.) ; Ootacamund, G. King, 8, August 1878 ; Coonoor Nilgiri, Dr. Prain, Jan. 1899.

form. CHARTACEA f. nov.

Ramuli novellis tomentosis, folia chartacea, venes prominentibus anastomosis, capsulis latioribus.

Younger parts tomentose with minute tawny hairs. Leaves chartaceous, lanceolate, oblanceolate, elliptic or elliptic-oblanceolate, abruptly long acuminate, cuneate at base ; veins prominent clearly anastomosing ; upper surface glabrous, lower tomentose or pubescent on the veins only. Boatshaped sepals slightly longer than the other two of the outer whorl. Capsule 17 mm. in diam., wing not prominent.

S. India : Travancore, 1500 mtr. T.F. Bourdillon (Type in Herb. Cal.) ; Attikan, Coimbatore, 1700 mtr. C.E.C. Fisher, No. 351 ; High Range, Travancore, Bourdillon No. 1113 ; Naterikal, Tinnevelly district, 1300 mtr. Hooper and Ramaswami No. 38536.

form. MEEBOLDII f. nov.

Folia membranacea breviter acuminata, flores pusilibus.

Younger parts adpressedly pubescent. Leaves membranous, elliptic or elliptic-oblanceolate, shortly and abruptly acuminate, glabrous above, sparsely puberulous on the nerves below. Flowers smaller. Fruits winged.

S. India : Ootacamund, 2700 mtr. A. Meebold No. 13843 (Type in Herb. Cal.) ; Udam banshola,

Travancore, 1500 mtr. A. Meebold No. 13109; Ihembaganur, Mathura district, S.H. College, Herbarium No. 509.

var. PURPURASCENS Clarke ex Mukerjee var. nov.

Venes foliorum prominentibus subtus teemidibus flores brevioribus, lobes stigmorum inaequalis non superposis a type recedit.

Erect shrubs. Leaves oblong lanceolate, acuminate, base acute or obtuse; pubescent on the nerves below with minute hairs, glabrous above; lamina 11-16 cm. long. 2-4.5 cm. broad; petiole 10-15 mm. long; net work of veins very prominent and raised below. Racemes 3-10 cm. long. Flowers long pedicelled, 12 mm. long. Ovary glabrous; style filiform, gradually wider near the stigma; stigma funnel-shaped, upper lobe short pointed, lower lobe bent downwards, appendaged.

Assam: Khasia, Mamloo, 1300 mtr. C. B. Clarke No. 45444B (Type in Herb. Cal.); Puipounji, 1600 mtr., G. Mann.

The varietal name was given by Clarke on the sheet. From the name it is presumed that the flowers are purple in colour.

var. ANGUSTIFOLIA CHOD. in Mem. Soc. Phys. Genev. XXXI, 2: 94 (1893).

Branches densely puberulous. Leaves linear-lanceolate or lanceolate, long cuspidate, puberulous beneath. Racemes short, rachis puberulous. Crest of the keel laciniate.

E. Himal.: Darjeeling, N. of Sinchal, T. Anders. No. 378.

POLYGALA KARENSIUM Kurz in Journ. As. Soc. Beng. XLI, 2: 292 (1872); Chodat Monogar. II, 101; Craib, Fl. Siam. En. I, 102; Gagnep in Supl. Fl. Gen. Indo-chine I, 2: 232 (1939).

P. catervifiora Craib in Kew Bull. 1913, 66.

Chamaebuxus karensianum Kurz in F. Fl. Brit. Burma I, 79 (1877).

A small shrub, about 1·5 mtr. high; branches slender, stem angular, pale coloured. Leaves oblanceolate or lanceolate, thinly chartaceous, glabrous on both surfaces, glaucescent beneath; lamina 8-15 cm. long, 1·5-4 cm. broad, acuminate, cuneate at base; petiole 1-2 cm. long. Racemes secund, leaf opposed or terminal, shorter than the leaves; short peduncled. Flowers white with pale lilac tips; bracts deciduous, 3·5 mm. long. Outer sepals 3, one 3·5 mm. long, cuculate, the other 2 oblanceolate, 2·6 mm. long. Wings slightly shorter than the keel, obovate-lanceolate, blunt. Keel twice as long as the inner petals, crest 2-lobed,

lobes many cleft. Ovary glabrous, style strap-shaped, stigma 2-lipped. Capsule about 10 mm. in diam., rotundate, with broad chartaceous wing, strongly notched at apex. Seeds obovate, silky hairy with a very short white strophiole.

Burma : Pegu, Pookee ridges, S. Kurz No. 46 ; Natatoung Mts. Rev. McCross. No. 42.

Assam : Khasia, Simons (in part).

Siam.

Polygala globulifera Dunn, in Journ. Lin. Soc. XXXV, 486 (1903).

Shrubs 6-8 ft., branches glabrous or pubescent. Leaves very large, membranous, rarely covered with minute hairs, obovate, shortly acuminate, base rounded or acute, 4-9 in. long, petiole short. Racemes terminal or leaf-opposed, smaller than leaves. Flowers yellow, white, as noted in the sheet from Burma, 9-10 mm. long ; pedicels 4-6 mm. long. Posterior sepals saccate 4 mm. long, the other 2 sepals ovate, 2 mm. long ; wings 7-8 mm. long. Crest globular in shape, plicate and convolute, not laciniate. Capsule red, 7 mm. in diam. broadly winged ; pericarp membranous, reticulate. Seed 4 mm. in diam. glabrous, half covered by aril.

Upper Burma : Chin hills, Abdul Huk.

In Herb. Cal. there are 3 sheets with leaves and fruiting racemes, one of King's Collector from Jowai, Assam, and two of S. M. Toppin R.A. No. 5015 from Putan, Upper Burma. These probably represent a variety of the above species but in absence of flowers these are not described here.

Polygala venenosa Juss in Lam. & Poir Engl. Meth. Bot. V, 493 (1804) ; King in Journ. As. Soc. Beng. LVIII, 2 : 130 (1898) ; Ridley Fl. Mal. Penin. I, 138 (1922).

Chamæbuxus venenosa var. robusta Hass. in Aus. Mas. Bot. Lugd. Bat. I, 155 (1863).

Tall glabrous shrub, 2 mtr. or more high. Leaves very large, membranous, soft, elliptic oblong or oblong, acuminate, narrowed at the base ; lamina 13-20 cm. long, 3·5-10 cm. broad ; petiole 5-12 mm. long. Racemes pendulous, dense flowered, axillary, 3-7·5 cm. long, elongated in fruit ; lower bracts as long as flowers, upper smaller. Sepals translucent, 2 smaller, obovate, the other saccate, 4 mm. long, wings with pink veins.

Keel not crested, chrome yellow, withering to violet pink. Capsule reniform, 8 mm. in diam., winged all round, purple. Seed with scarlet aril.

Burma : Ruby Mines Division, Mogok, 1500 mtr. A. Rodger No. 102.

Malaya Peninsula ; Java.

Polygala tricholopha Chodat. in Mem. Soc. Phys. Genev. XXXI, 2 : 98 (1893).

P. hasskarlii Merrill & Chun in Sunyatsenia 2 : 254 (1934-35).

Chamæbuxus paniculata Hassk. in Aus. Mus. Bot. Lugd. Bat. 1 : 154 (1863).

Shrubs. Leaves oblong-obovate or elliptic-oblong shortly acuminate, chartaceous, glabrous below, minutely hairy on the nerves above, veins prominent, raised below ; lamina 9-15 cm. long, 3-6 cm. broad, petiole 4-6 mm. long. Flowers in erect terminal panicles which are up to 15 cm. long, distinctly gibbous, reddish purple and yellow. Petals acute, crest multifid, deeply incised.

Assam : Wall. Cat. 4191 B (in part) ; Khasia—Garden Coll. Herb. B.B.C. No. 6 ; Haflong—N. Cachar, 1,000 mtr. W.G. Craib No. 403.

Sikkim : Rinchingpong, 1,300 mtr. Anderson No. 378.

Upper Burma : Kachin Hills, Shaik Mokim.

China.

In Herb. Cal. there is a sheet, viz., Jowai, Assam, King's Coll. This has a fruiting panicle and narrowly elliptic leaves, but no flowers. This appears to be a distinct variety.

What have the Kew Gardens and Herbarium got to teach us

By *Sri S. N. Chandrasekaran, M.A.*

Before the question "What have the Kew Gardens and Herbarium got to teach us" is answered, one must know as much as possible all about these gardens and the herbarium inasmuch as they are both sought by all students of Botany, from all parts of the world and at all times, for purposes of study and research. Such a study gives us an answer to our question.

The gardens and the herbarium have been serving as centres of research on account of the richness of their collections of living plants in the gardens, the abundant valuable material in the herbarium, representative of the world's flora, the museum specimens and last but not the least their invaluable botanical libraries. It has also to be mentioned that the gardens are famous for their beauty as much as of botanical interest and have therefore been inspiring to the people who have been visiting them either for study or for recreation.

The first and a very important lesson that we learn from such a combination of a beautiful and botanically instructive garden with an equally valuable herbarium is that this judicious mixture is a necessity. We have in the Sibpur Gardens of Calcutta and the herbarium attached to it, such a healthy combination in India. It is very essential that the Botanical Garden attached to the Madras Herbarium is developed into a first-rate garden, with scientific outlook to a research level. The gardens attached to a premier research institute which has built up a wonderful herbarium over a period of a century must certainly be more than what it is to-day. The gardens should have practically all the plants of India at least to begin

with and in the course of a decade or two, a world collection. They should be sought by all University students and for the Systematic Botanist they should be of help for his research work. The Kew Gardens have played a very great part in the distribution of plants of economic importance. To be brief, almost every student of botany knows that it is from Kew, that India got its cinchona, Para rubber, the Chinese Tung oil, etc.

It was with the help of the Kew Herbarium that Sir J. D. Hooker wrote the classical "Flora of British India" which is still our standard flora. All the other floras in current use, such as the "Flora of the Bombay Presidency" by Cooke, the "Flora of Madras" by Gamble (later finished by Fischer), the "Flora of the Upper Gangetic Plain" by Duthie, etc., were all based largely on the specimens preserved at Kew and on specimens sent to Kew on loan by the herbaria at Calcutta, Madras and Bombay. What Kew has done to help in the writing up of the floras of the various parts of India could be amplified as most of these floras are incomplete inasmuch as there are vast regions still remaining unexplored and several valuable species still to be described. In this phenomenal world of change, old species become extinct and new species are coming into existence. With our present knowledge of the origin of species, there is room for thinking that not only species should have arisen due to natural and promiscuous crossing and fixation of hamozygous types, but there must be species which should have come into being due to mutation. Not only this, several varieties and forms of the old and the new species should have also covered our soils. We have in our midst today not only the indigenous species but several which have entered our country from other countries due to some reason or other and have got acclimatized. As such, there is a wealth of material awaiting exploration and study. There is splendid work for a team of young men and women botanists. All that is required is just as Kew has been training people and shaping them into eminent botanists, some of whom came to India and did valuable work, it is up to us who have inherited a valuable herbarium in Madras, to train young botanists from time to time who should be fitted to do this kind of work. Such a training is not confined to the four walls of the herbarium but lies more in the depths of the forest, where the eye is trained to discover fresh plants and where the details of collection, pressing, preserving are all taught in a more fitting manner. We want more district floras which will go to

throw a good deal of light on the local climatological and soil conditions and help us to plan agriculture, forestry, horticulture, etc.

"The Flora of the Nilgiri and Pulney Hill-Tops" by P. F. Eyson has been very helpful in the study of the flora of these places. Dr. F. H. Gravely of the Madras Museum, who has since retired, gave the idea of writing up local floras and the one written up by Mayurnathan on "The Flowering Plants of Madras City and its Neighbourhood" is serving a very useful purpose to those in Madras interested in botany.

We want more and more of these to represent every district. There is a talk that a plant introduction bureau is to be set up in Delhi. It is a very welcome move. Such a Central institute should take for co-operation, the institutes at Coimbatore, Calcutta and Dehra Dun as in all these places there are excellent herbaria and eminent botanists. Plant introduction work has had a chequered career in India and it is never too late to mend. Coimbatore gardens and the herbarium should play a prominent part for introduction work in South India and while Coimbatore can serve for the plains, the Ootacamund and Coonoor gardens can serve places of higher elevation.

Kew has been serving humanity not only through her gardens and the herbarium but also through her museums. In the museums attached to Kew there are plant products of economic importance, valuable timbers, articles from various woods ranging from tool handles to a cricket bat and a good many things of interest for study.

A well-developed up-to-date museum is very essential to an agricultural research institute where one should be able to see at a glance the latest products of research, the valuable strains sought by the ryots, the sources of our drugs, the timbers particularly suited for agricultural implements, etc.

It must be our ambition to make the masses happy and who are the masses but the villagers! As men of science, it should be our endeavour to do our utmost to develop what we have on the one hand and discover more and more wealth lying hidden in our rich forests. With what we possess and what we gather, we should serve the public and our happiness must lie in making the masses happy.

A Short Account of the Flora of Tirunelveli District

By

Sri C. Rajasekhara Mudaliar, M.A.
(Systematic Botanist and Professor of Botany)
&
Sri D. Daniel Sundararaj
(Lecturer in Botany)

Tirunelveli is the southernmost district of the Madras State and covers nearly 4,300 square miles, comprising eight taluks of Sankarankoil, Koilpatti, Tenkasi, Ambasamudram, Nanguneri, Tirunelveli, Srivaikuntam and Tiruchendur. It is bounded on the east and the south by the Gulf of Mannar, on the west the Western Ghats and its slopes, and on the north the taluks of Srivilliputtur, Sattur and Aruppukkottai of Ramanathapuram district. Its geographical position is so unique that it has a profound effect on the vegetation and flora of the district which has been rightly considered as " an epitome of the whole of the Madras State." Further its nearness to the big island, Ceylon, with its rich vegetation, adds interest to a botanist. Probably with all these aspects in view, Sri K. Rangachari started as early as 1917, a thorough botanical survey of this district to compile the regional flora. Though the work started by him was not pursued for years, this was again taken up from 1945 and the flora of the district has been prepared and completed. A short account of the flora of the district as prepared from these detailed surveys is presented here. (A detailed account will form the flora of Tirunelveli district which has just been completed and await publication.)

Ecological factors that influence the vegetation of the district.

Topography.

The Western Ghats on the western boundary form the great and rugged barrier of hills towering to an average of 5,000 feet on the sky-line and with over twenty peaks going up to over 5,000 feet and some as Kottaimalai and Agastyamalai reaching 6,335 and 6,125 feet respectively. It is in these

ghats that all the rivers of the district take their origin. From the foot of the ghats eastwards, the whole region is a great plain sloping very gradually toward the sea, except for the occasional low hills and sand dunes.

The chief river of the district, Tambaraparni rises from the Periya Pothigai and has a catchment area of over 200 square miles. It makes a course of nearly 75 miles to the sea, draining through an area of about 1,750 square miles. The sea-coast extends from Vembar on the north to a point very near Cape Comorin on the south having a coast line of nearly 85 miles.

Edaphic conditions.

The greater part of the northern area comprising the Koilpatti taluk, the northern tract of Srivaikuntam and Sankarankoil taluks have the stiff "black-cotton" soil. Embracing much of Sankarankoil and western Koilpatti, the areas rising from the river valleys as in Ambasamudram and Tirunelveli, Nanguneri and Srivaikuntam taluks have the red loams, and often gravelly. Rich red loamy areas occur here and there and especially around Courtallum. The eastern tracts stretching along the coast line have sandy loams and certain areas are saline and subjected to inundation by the high tides of the sea. Peculiar red sandy undulating formations locally called 'teris' are found in a few places and these too on near approaches to the sea coast.

Climatic factors.

The district has generally light rainfall averaging about 28 inches and dry hot weather. The south-west monsoon does not penetrate far down the western ghats eastwards, since the rains are precipitated on the western slopes in Travancore. Lying immediately under the ghats, the plains receive very little rainfall during the south-west monsoon. The average maximum rainfall is received during the north-east monsoon between October to December. The hottest months are May and June when the temperature goes over 104°F and the lowest temperature experienced during January touch about 65°.

Vegetation of the district.

The vegetation of the district can be broadly grouped under the following six heads, viz., (1) the evergreen forests occurring over 2,500 feet on the Western Ghats, (2) the deciduous forests at elevations ranging from 500 to 2,500 feet, (3) the

scrub jungles below 500 feet and at the foot of the ghats and on hillocks, (4) vegetation of the plains, (5) vegetation of the 'theris' or red-sand hills and (6) the coastal vegetation. Though each group gradually merges into the other without any clear-cut division, these areas are characterised by district species.

(1) *The evergreen forests.*—These are found over 2,500 feet and can be considered as the highly developed ecological type of vegetation. The whole of this area is covered with shola forests. The characteristic moist evergreen forests or the rich sholas occur in Singampatti and Kannikatti areas where high forest growth with three tiers of vegetation is met with. The first tier consists of *Aporosa acuminata*, *Cinnamomum gracile*, *Hydnocarpus alpina*, *Bacaurea courtallensis*, etc., with under-growths consisting of large groups of *Begonias*, *Violas*, *Impatiens*, Ferns, Selaginellas, grasses, sedges, etc. The second storey consists of species like *Artocarpus integriplia*, *Gordonia obtusa*, *Nephelium longanum*, *Pygeum-wightianum*, *Garcinia* spp., *Litsaea* sp., etc. The third and topmost tier being of *Cullenia excelsa*, *Myristica beddomei*, *Gluta travancorica*, *Eleocarpus tuberculatus*, *Mesua ferrea*, etc. The little open slopes and ravines in this area are scattered with *Pandanus*, *Calamus*, *Laportea crenulata*, *Pinanga*, *Caryota*, and *Musa acuminata*.

In Kalakad, Sengalteri and Natterikal areas the evergreen forests occur on a little higher elevation of about 3,000 feet due to the decreasing rainfall. In these sholas *Pallaquium ellipticum* and *Mangifera indica* often form the common types besides those mentioned above. *Gluta travancorica* and *Mesua ferrea* are the two species which are rare in these sholas while they are plenty in Kannikatti and Singampatti forests.

Nadugani, Mahendragiri and Courtallum have also the evergreen forests, but of a type poorer than those above described. These are moist only for a part of the year.

Along the higher slopes and above the belt of shola forests extensive areas are often covered with *Ochlandra brandisii* and *O. travancorica* which grow to about 15 feet and become gregarious and impenetrable. On steep rocky slopes the attractive palm *Bentinckia Coddapana* arises here and there among the bushy growth of grasses and wild bananas. On exposed tops of the mountain peaks and slopes, grassy plains with short growing types mixed with *Leucas Aneilema*, *Striga*, etc., occur.

(2) *Deciduous forests.*—Though the forests occurring above 500 feet and up to 2,500 feet on the Western Ghats can be brought under the deciduous forests, the areas above 1,500 feet generally give rise to species which in a way may be termed as 'semi-evergreens' as the *Balanocarpus utilis*, *Hopea parviflora*, *Dalbergia latifolia*, *Chukrassia*, *Artocarpus Diospyros*, *Bischofia*, *Aglaia*, etc. The undergrowths consist of the gregarious *Strobilanthes*, *Glycosmis*, *Helicteres*, *Commelinas*, *Scutellaria*, *Oplismenus*, etc.

The lower elevations on this type of forests carry *Tectona grandis*, *Pterocarpus marsupium*, *Dalbergia* spp., *Albizzia* spp., *Hardwickia binata*, *Terminalea belerica*, *Chloroxylon swietenia*, *Schleichera trijuga*. The undergrowths consist of *Murraya exotica*, *Pavetta indica*, *Mundulea suberosa*, *Cadaba trifoliata*, *Vitex altissima*, etc.

Along streams the trees are of the evergreen type, though shorter in height as the *Pongamia glabra*. On moist rocks *Aneilema paniculatum*, *Cynotis*, *Impatiens*, *Didymocarpus*, etc., are commonly met with. *Pouzolzia* spp. with the drooping branches often flank the sides of streams.

(3) *The scrub jungles.*—On elevations below 500 feet and at the foot of the hills, the vegetation is of xerophytic types. The plants occurring on regions bordering the deciduous forests are less xerophytic than those occurring at the foot of hills. These form scrub jungles consisting of thickest of shrubs and trees, most of them on the lower regions being thorny as the *Zizyphus*, *Capparis*, *Acacia*, *Euphorlia* and *Barleria* species. Though the plants are more or less the same as occurring on the plains, their growth in close associations with other species as *Alangium lamarckii*, *Albizzia amara*, *Canthium parviflorum*, etc., which are characteristic of this area, give a different effect to the vegetation.

On the higher regions bordering 500 feet, species as *Tectona grandis*, *Cochlospermum gossypium*, *Butea frondosa*, *Givotia rotteriformis*, etc., are found with undergrowths of *Ixora parviflora*, *Plectronia parviflora*, *Maba buscifolia*, *Notonia grandiflora*, *Coleus spicatus*, *Asystasia*, etc. In many of the scrub jungles near Naterikal, Kalakad, Papanasam and Courtallum, *Lantana* has become an aggressor dominating often the road sides. In Kalakad area, some of the neglected coffee estates have been overrun by this plant.

The ravages by village cattle and the indiscriminate denudation of the forests near villages show indications of many of the deciduous forests

tending to become the drier scrub jungles. The important places where this has left a visible change within the last ten years are near Papanasam, Mundanthorai and Kalakad.

(4) *Vegetation of the plains.*—The vast plains from the foot of the Western Ghats to the coast carry different types of vegetation depending upon the soil types and the course of the river. The red gravelly areas arising on the river valley on Ambasamudram, Nanguneri, Sankarankoil and Srivaikuntam taluks have the xerophytic vegetation whereas the irrigable low lands are utilized for agricultural crops. The xerophytic vegetation is composed commonly of *Dodonea viscosa*, *Euphorbia*, *Calotropis*, *Cassia angustifolia*, *Cassia nigricans*, *Jatropha gossypifolia*, with short and sparse tree growths of *Acacia planifrons*, *A. leucophloea*, *Morinda tinctoria*, *Albizzia amara*, *Azadiracta indica*. *Agave wightii* and *Commiphora berryii* are two species which thrive as hedges and *Ficus benghalensis*, *Wodina odiar* and *Delonix elata* as avenues.

On the black soil areas of Sankarankoil, Koilpatti and Srivaikuntam taluks, the tree growth is very sparse, except for the stray *Acacia arabica*, *Morinda tinctoria*, *Azadiracta indica* giving a barren look for most part of the year. The herbaceous species are *Triumfetta rhomboidea*, *T. rotundifolia*, *Indigofera trita*, *Chrozophora rottleriana*, *Aristolochia bracteata*, *Cassia* spp., *Jatropha glandulifera* and a few grasses as *Andropogon pumilus*, *Chloris bourneii* and *Cynodon dactylon*, the latter often being a pernicious weed in most of the black soils. *Ophiorus exaltatus* has come to stay as an effective soil binder along railway embankments. The endemic species of Sorghum, *S. stapfi*, occurs in the black soil areas near Maniyachi.

The plains bordering the coastal areas as in the eastern parts of Srivaikuntam, Tiruchendur and southern parts of Nanguneri taluks are sandy loams and are characterized by *Acacia planifrons*, *Borassus flabellifer*, *Dichrostachys cinerea* and *Randia dumentorum*. Avenues of *Thespesia*, *Hisbiscus tiliaceous*, *Wodina odiar*, *Azadiracta* and *Ficus bengalensis* are the only other species which constitute the tree growths in this region. *Cassia obtusa*, *C. angustifolia*, *Jatropha gossypifolia*, *Tephrosia purpurea* form the important shrubs. On the whole, except for the regions under cultivation, the plains have poor growth of vegetation giving a barren appearance as in the vast stretches of lands around Palayamkottai and Sankarankoil

which could be developed with tree species as *Prosopis juliflora* and *Delonix elata* and hedges like *Agave wightii* and *Commiphora*.

(5) *The vegetation of the red sandy areas.*—Peculiar red sandy areas in the form of sand hills occur in three places along the East Coast. Of these the Kudiramoli 'theri' covers an area of 21 square miles. The sand is drifted by the high winds during the south-west monsoon period and the sky above this area presents a reddish hue. The vegetation in this area is of an interesting type, though very poor. *Dodonea viscosa*, *Dalbergia multiflora* and *Dichrostachys cinerea* are the only bushy growths with the few creepers as *Leptadenia reticulata* and *Cyperus arenarius* found on unexposed slopes. The trials by the Forest Department to raise *Anacardium occidentale*, *Casuarina equisetifolia* and *Acacia planifrons* have not met with success; the plantings of *Borassus flabellifer* are making very slow progress, due to the soil, windy nature and low moisture content. *Prosopis juliflora* with proper treatments to enable quick establishing in the soil immediately after rains is worth the trial in this area.

(6) *The coastal vegetation.*—The coast extending from Vembar down to Tiruchendur has foreshore sandy region which is broken at places into shallow depressions wherein the waves are washed in during high tides. On the sandy shores, *Spinifex squarrosus* is the common species with a few stray plants of *Ipomoea pescaprae*. In the saline flats *Salicornia*, *Sesuvium postulacastrum*, *Suaeda*, *Arthrocnemum* and *Atriplex* are commonly met with. On the margins of these saline areas *Lippia nodiflora* and *Eleusine lagopoides* give a green mat-like spread. The few saline marshes near Vembar support the mangroves as *Avicennia officinalis*, *Pemphis acidula*, *Lumnitzera*, etc.

The few small islands near Tuticorin have the vegetation characterized by the presence of *Salvadora persica* and *Thespesia populnea* along with the halophytic plants, a few grasses and *Cissus quadrangularis*.

In the shallow waters along the coast, the phaenerogamic submerged and rooted *Cymodocea serrulata*, *C. australis*, *Halophila ovata* and *H. stipulata* are found. The cryptogamic sea weed occurring in these waters are said to be over a hundred species according to Rangachari.

Important aspects of the Flora of Tirunelveli district.

From the botanical surveys conducted in the district and the flora which has been prepared, it

is found that out of the 179 families dealt for Madras State (undivided), as many as 157 families are represented in this district. The following figures give in short, an idea of the genera and species represented in the flora of the district compared to that of the whole undivided State :—

Total number of species of the Madras flora (as brought out by Gamble)	4,390
Total number of species recorded in the Tirunelveli flora	2,105
Percentage of species represented in the district flora	47.9
Total number of genera in Madras flora	1,256
Total number of genera in Tirunelveli flora	872
Percentage of genera represented in the district flora	69.4

As seen from the above data, the district is very rich in its representation of the families, genera and species. The predominant families with the maximum number of species are arranged below in the order of their rank :—

Families.	Number of species in Tirunelveli.	Number of species in Madras State.
1 Leguminosae	201	433
Papilinaceae—133		
Caesalpiniaceae—38		
Mimosaceae—30		
2 Graminae	145	386
3 Rubiaceae	128	214
4 Euphobiaceae	115	194
5 Acanthaceae	87	200
6 Compositae	82	186
7 Cyperaceae	50	171
8 Orchidaceae	47	194

The flora of the district has another special feature that a number of plants characteristic of Ceylon as *Pyrenacantha volubilis*, *Eugenia rotundata*, *Mussaenda frondosa*, *Musa acuminata*, *Filicium decipiens*, *Garcinia echinocarpa* and several others are found here. On the other hand the commonly occurring *Musa balbisiana* of Ceylon, is not found in this area.

Hortus Malabaricus

By *Sri M. B. Raizada, M.Sc., F.N.I.*
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The Hortus Malabaricus is the oldest publication on Indian plants written in a European language. It is a classical work on the flora of Malabar and one that is essential to the Indian Systematist even to-day. This is not because of any system of classification it proposes, for the work follows no definite system, nor on account of priority of its names, as the work is pre-Linnean. The great importance of this monumental work is due to the fact that later authors (Linnaeus and others) have made the descriptions and figures of this book the actual 'types' of many binomials. As an original source the Hortus Malabaricus stands pre-eminent among all the early publications on Indian Botany. Its quality is so convincing that it was—like its contemporary, the Herbarium Amboinense, another pre-Linnean book—acknowledged immediately on its appearance to be authoritative, and it has maintained its pre-eminent place to the present day as a source of valuable information.

It is by-no means certain that the importance of the Hortus Malabaricus is fully appreciated. The number and size of the volumes, twelve folio ; the number of printed pages, and the number of plates, 784, give but an inadequate idea of the amount of data contained in this superb work. Its descriptions are ample, though not always very useful from the modern botanical point of view and to these are often appended discussions of the economic uses of the various plants described. Few works on Indian Botany, published since Hortus Malabaricus was written, can compare with it in the amount and variety of original data. When it is realized that practically all of the immense mass of data included in this great work represents the observations and accumulated knowledge of the time, the great energy and ability displayed by its compiler, Rheede, in preparing this monumental work, which was accomplished under very adverse circumstances and took 25 years in publication, can be more fully appreciated.

The main directive force in compiling Hortus Malabaricus was H. A. van R(H)EEDE TOT (VAN) DRAA(C)KE(N)STEYN. He was born

in 1637 at Draakesteyn Castle, near Utrecht (Holland) and after an adventurous but prosperous career in the Dutch East India Company was appointed Governor of the territory of Malabar in 1669. Some not quite explained difficulties caused his return to Europe in 1677. There together with learned men at Leyden he devoted much of his time in supervising the edition of the botanical work written during his term of office. In 1684 he was again sent to the Indies on an important auditing commission but, in the middle of his task, died in 1691.

This short biography suggests no scientific training and RHEEDE himself admitted candidly his inexperience as a botanist. Nevertheless, he must have been an exceptionally keen observer, because while his contemporaries scarcely noticed more component parts of the tropical vegetation than, as a rule, some variety of edible fruit, RHEEDE noted: (transl.) " I observed on my travels the extraordinary diversity of the trees . . . . . so that it would be difficult to obtain two trees of the same kind in one forest; I saw trees girdled and covered by other plants, while others . . . . with the tree they were covering, were confounded until they could hardly be distinguished; I noticed often also, speaking in comparison, numerous ivies of different kinds clinging to one tree and besides many growing into the very branches of the trees, and on the foot of the trunk other and still other plants forming a most attractive spectacle, and on one single tree ten or twelve different sorts of leaves, flowers, and fruits might be met with."

Here, for the first time was a man who was not overwhelmed by the welter of luxuriant green of the tropical vegetation, but who analysed and defined its components, discerning both the structure of the whole and the variety of its details. So far, explorers had been repelled and daunted by the wild primeval forests; now these forests were discerned to offer a 'most attractive spectacle'; here lies the mainspring to RHEEDE'S achievement.

RHEEDE, with all his love for plants, knew his limitations and wanted assistance but, on the Cochin Coast, where he resided as the Dutch Governor of Malabar, trained botanists were rare. Becoming acquainted with a Neapolitan Carmelite missionary, Father MATTHEUS (PIETRO FOGLIA or MATTEO DI S. GUISEPPE), he found that this roving priest had occupied himself a long time with the flora of the region. He had

collected and made many notes and drawings. From the beginning, RHEEDE'S aim was to attempt a description of all species of the territory and he set out with MATTHEUS'S on the great task. MATTHEUS'S data proved rather unsatisfactory; his dried specimens were not always suitable for an adequate drawing. This shortcoming naturally became the more apparent when the living plant was at hand and could be compared; and his drawings were not quite clear in certain details. MATTHEUS and RHEEDE went out together to hunt for better samples but, MATTHEUS, well past fifty, had lost much of his agility and the Governor, much the younger but fond of a comfortable life, scarcely proved a better collector. At this time, HERMANN spent some weeks at Cochin and was approached for advice. For a moment it was considered to put all materials into his able hands but HERMANN declined the offer and, while the pair of bold amateurs availed themselves of his help as long as he would stay, it was decided to look for other assistance. JOHANNES CASEARIUS was invited to join forces with them.

CASEARIUS was a Reformed Church minister, officiating on behalf of the East India Company at Cochin during 1675-1677. He loved plants but was scarcely better equipped for scientific botanical work than RHEEDE and MATTHEUS; he has been described as 'a man most versed in all learning, if only Botany was excepted'. He had, however, command of Latin and could translate the texts in good erudite language; CASEARIUS thus wrote the Latin version of the first two volumes of Hortus Malabaricus. Shortly before CASEARIUS began work, RHEEDE commissioned in 1674 the learned Brahmins RANGA Bhatta, VINAYAKAYA Pandita (the Pandit Vinayakaya) and APPU Bhatta, to assemble all plants contained in ancient work Manhaningattnam and to add all they knew about these. HERMANN'S counsel could be readily divined in this change of policy: Hortus Malabaricus was now placed on scientifically the most favourable foundation possible, a book representative of old local learning and also based on an accumulation, interpretation, and revision of all available data gathered by men who might be regarded as the best informed on the subject. Another specialist was added to this Staff, ITTI ACHUTHAN, a native Pegu physician, who was called to Malabar, contributed many native plant names, and explained the reputed medicinal virtues of certain species.

These initial steps towards preparing a 'complete' flora took nearly two years. Then, confronted with the realities of the immense task of compiling a book of this magnitude—one understands the size and endless variety of the tropical Indian flora only gradually as experience and knowledge grow—RHEEDE felt that Hortus Malabaricus required a still larger Staff.

Four native draughtsmen employed for this special purpose now accompanied him on his trips (though the final work contains a number of drawings made after MATTHEUS'S originals), a body of fifteen or sixteen Brahmin naturalists and physicians drafted descriptions; in addition, all native princes and chiefs in the territory had been asked for help. Collectors went out, instructed to search for specimens in flower or fruit; many first sketches were made on the spot to be perfected and finished at home, and hundreds of samples arrived which were classified, studied, and delineated by word and pencil. RHEEDE, swamped by materials, sighed: "Often were more plants roughly outlined in one day than could be drawn and described in several months by the draughtsmen and CASEARIUS."

After CASEARIUS, fallen ill, had left (he died in 1678 at Batavia), the Latin translation was entrusted to CHR. H. DE. DONEP (or VAN DOUET), who for his work used the Portuguese version by E. CARNEIRO, the latter having in his turn received the text in Malayalam, written by COLADDA, another Pegu physician, the teacher or ITTI ACHUTHAN. There was also, at some stages, help from the able WILLEM TEN RHIJNE, repeated afterwards in Holland during the printing of the first two volumes.

When the differences in training and scientific standing among the numerous collaborators in this early instance of team work are realized, apart from the repeated translations by interpreters unschooled in natural sciences which became necessary the results are amazing and betoken the skill on the part of the editors in Holland.

RHEEDE began to send manuscripts and illustrations asking the Leyden scientists to keep these till the whole work could be completed and suitably arranged; but apparently due to high enthusiasm, printing started without delay. ARNOLD SEYEN (or SYEN), Professor in Leyden University, presented the first volume on May 8th, 1678, to the Board, having added to the text notes partly supplied by HERMANN in letters from Ceylon; it was published in the same year. SEYEN died and was succeeded by J. COMMELIJN, who

edited the descriptions and attended to the publication till, in 1703, the 12th volume brought the HORTUS to an end.

Other co-editors were J. MUNNICKS (vol. 2-5), T. J. VAN ALMELOVEEN (vol. 6), and A. VAN POOT (vol. 7-12). The entire work contains 784 plates and descriptions.

The HORTUS MALABARICUS attracted the attention of all the learned world ; its early publication, numerous first records, and wealth of new facts made it hold the interest of Indian and Malaysian botanists ever since. Originally a separate Dutch version was intended, but only a translation of the first two volumes came from the press (1688 or 1689) and re-issued with a changed frontispiece in 1720. J. HILL made an English edition and added a Linnean Index in 1774.

The identification according to modern systematics of the species under discussion has been thwarted by the absence of dried specimens ; as far as is known RHEEDE sent no Herbarium to Europe, though he forwarded living plants from Ceylon and Malabar to the Amsterdam 'Hortus Medicus' ; he also cultivated many species dealt with in Hortus Malabaricus in the garden of his residence at Cochin. No thorough search has been made for authentic specimens of RHEEDE'S but it is doubtful whether the discovery of some specimens would do more than confirm what is known and be more than a historically interesting find. The interpretation of the species based only on description and plate, is impossible or uncertain in only a few cases, the majority having been illustrated and described with unmistakable clarity.

The arrangement of the plants in the several volumes is, partly due to their premature issue, somewhat disorderly and, considering the period of their publication, decidedly primitive. The classification is primarily the ancient one of trees, shrubs, and herbs and even that has not been followed strictly. Typically pre-Linnean traits may be noticed, e.g., *Caesalpinia pulcherrima* Sw. (Hort. Mal. 6, p. 1) is meticulously drawn and very closely described but in the drawing not a single flower shows the correct number of stamens. A separate (7th) volume is—much to the taste of the day—devoted to woody climbers.

C. COMMELIJN was the first in attempting to create order by publishing a catalogue and index to part of the work in 1696. This HORTI MALABARICI CATALOGUS contains an important bibliography of early Indian botany and RHEEDE'S

names are reduced and made conform to the existing scientific literature. In 1769, J. BURMAN made another index in accordance with LINNAEU'S SPECIES PLANTARUM. A. W. DENNSTEDT (Schlussel Zum Hort. Ind. Mal., 1818) wrote a key in 1818.

The first critical study and interpretation of this first great Indian work on plants was written by F. BUCHANAN-HAMILTON, Director of the Calcutta Botanic Gardens from 1814-1815 (Trans. Linn. Soc., London, 1822-1837), but printing was discontinued in 1837 when but three volumes had been dealt with. BUCHANAN'S entire manuscript is in the possession of the Linnean Society of London. J. K. HASSKARL (of Buitenzorg) made elaborate but not entirely successful interpretations in 1861, 1862 and, finally, in 1867. A new interpretation of HORTUS MALABARICUS, I understand, is now kept in provisional manuscript by Dr. A. H. G. ALSTON of British Museum, London.

Of this most interesting work, the plates are the best part ; in fact some of these are so good that there is no difficulty in identifying them with the species which they are intended to represent. The text is in Latin, but the names of the plants are also given in Sanskrit, Arabic and Malayalam.

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